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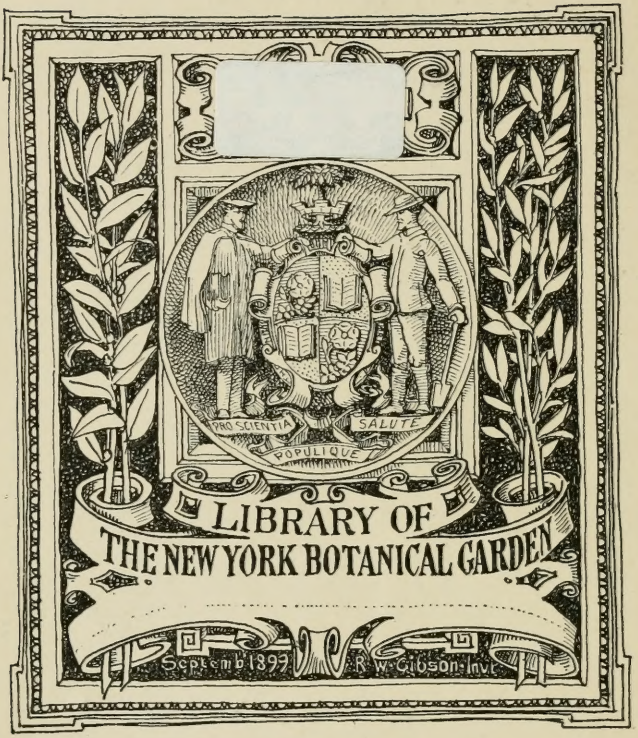
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NINETEENTH ANNUAL REPORT

OF THE

SECRETARY

OF THE

Massachusetts Board of Agriculture,

WITH AN APPENDIX

CONTAINING

REPORTS OF DELEGATES APPOINTED TO VISIT
THE COUNTY EXHIBITIONS,

AND ALSO

RETURNS OF THE FINANCES OF THE AGRICULTURAL SOCIETIES.

FOR

1871.

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STATE BOARD OF AGRICULTURE.
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MEMBERS EX OFFICIIS.

His Excellency WILLIAM B. WASHBURN.
His Honor JOSEPH TUCKER.
Hon. OLIVER WARNER, *Secretary of the Commonwealth.*
WILLIAM S. CLARK, *Pres. Mass. Agricultural College.*

APPOINTED BY THE GOVERNOR AND COUNCIL.

	Term expires
LOUIS AGASSIZ, *of Cambridge,*	1873
MARSHALL P. WILDER *of Boston,*	1874
JAMES F. C. HYDE, *of Newton,*	1875

CHOSEN BY THE COUNTY SOCIETIES.

Massachusetts,	LEVERETT SALTONSTALL, of Newton,	1874
Essex,	GEORGE B. LORING, of Salem,	1875
Middlesex,	JOHN B. MOORE, of Concord	1873
Middlesex North,	JONATHAN LADD, of Lowell,	1874
Middlesex South,	JOS. N. STURTEVANT, of So. Framingham,	1875
Worcester,	O. B. HADWEN, of Worcester,	1875
Worcester West,	THOMAS P. ROOT, of Barre,	1875
Worcester North,	EUGENE T. MILES, of Fitchburg,	1875
Worcester North-West,	FARWELL F. FAY, of Athol,	1874
Worcester South,	NEWTON S. HUBBARD, of Brimfield,	1874
Worcester South-East,	WILLIAM KNOWLTON, of Upton,	1873
Hampshire, Franklin and Hampden,	A. PERRY PECK, of Northampton,	1873
Hampshire,	LEVI STOCKBRIDGE, of Amherst,	1874
Highland,	JONATHAN McELWAIN, of Middlefield,	1875
Hampden,	WILLIAM BIRNIE, of Springfield,	1873
Hampden East,	HIRAM CONVERSE, of Palmer,	1873
Union,	ENOS W. BOISE, of Blandford,	1874
Franklin,	THOMAS L. ALLIS, of Conway,	1874
Deerfield Valley,	ROGER H. LEAVITT, of Charlemont,	1875
Berkshire,	ANDREW J. BUCKLIN, of South Adams,	1873
Hoosac Valley,	NAHUM P. BROWN, of North Adams,	1873
Housatonic,	RICHARD GOODMAN, of Lenox,	1873
Norfolk,	ELIPHALET STONE, of Dedham,	1874
Hingham,	ALBERT FEARING, of Hingham,	1873
Bristol,	AVERY P. SLADE, of Somerset	1875
Bristol Central,	NATHAN DURFEE, of Fall River,	1873
Plymouth,	CHARLES G. DAVIS, of Plymouth,	1875
Marshfield,	GEORGE M. BAKER, of Marshfield,	1873
Barnstable,	S. B. PHINNEY, of Barnstable,	1874
Nantucket,	ANDREW M. MYRICK, of Nantucket,	1875
Martha's Vineyard,	HERMAN VINCENT, of Chilmark	1874

CHARLES L. FLINT, *Secretary.*

NINETEENTH ANNUAL REPORT

OF THE

SECRETARY

OF THE

BOARD OF AGRICULTURE.

To the Senate and House of Representatives of the Commonwealth of Massachusetts.

The products of the farm, and, of course, the prosperity of the farmer, are dependent very much upon the characteristics of the season, and especially upon the distribution of warmth and moisture throughout the growing months. Neither the aggregate amount of rainfall, nor the average range of the thermometer, will convey an accurate idea as to whether the conditions are favorable or unfavorable for the growth of plants. It is the general distribution of rain and heat from which we are to judge of the season in its relation to the productive industries of the farm.

Nor is this all. The character of one season has its influence upon the crops of succeeding years. This fact has been quite apparent during the past year, so apparent as to become a subject of common remark among farmers. The severe and almost unprecedented drought of 1870 affected all tillage lands, mowing and pasturage, to an extent rarely observed before. The old fields did not recover, and have not yet recovered, from its effects. But its influence was complicated by another drought, of less severity to be sure, but taken in connection with that of the preceding year, and the open winter interven-

ing, scarcely less disastrous to all forms of plant growth. With the exception of a few localities favored with occasional showers, the hay crop was in consequence diminished to a considerable extent, root crops on the drier lands failed, and the pastures became so short as to compel farmers who had neglected to sow corn for fodder, to resort to their winter stores of hay in the barn. The almost total failure of the apple crop, which may naturally enough be ascribed to other causes than the peculiar nature of the past summer, and partly indeed to the overbearing of the season previous, has contributed to make the year one of uncommon hardship to the farming community.

The most obvious lesson to be derived from the experience of the year is, the importance of deep and thorough cultivation and the frequent stirring of the soil among our cultivated crops. Lands that have been deeply tilled have suffered less from the dry weather than others. Even the old fields that were in a high state of cultivation have suffered less than those that had been allowed to run out. On these lands the hay crop was so slight as, in many instances, to be scarcely worth the expense of gathering. The only thing left in such cases was to plough up and re-seed; this has been done to a greater extent, probably, than in any previous season. This operation involves expense, and is attended with some risks of loss and failure of the seed to take, especially when the supplies of manure are inadequate. Unless the land is already in a high state of fertility from previous cultivation, it is idle to expect a "good catch" without an application of manure. This is necessary to stimulate the young plant to the formation of roots, and to push it forward to a size and strength which will enable it to withstand the obstacles to its growth.

Another equally obvious lesson which the experience of the year teaches is, that the sowing of any grain with our grass seed is detrimental and to be avoided. The low yield of the grass and hay crops may be ascribed very largely to the failure, more or less complete, of newly sown lands. Estimating the loss to the whole State from this source by what is known in a single town where the facts have been gathered with care, and it cannot fall short of half a million dollars. This includes the loss of seed and expense and cost of labor in sowing, or the immediate preparation for it.

The cases are rare where the seeding with grain of any kind will not entail a loss of from twenty to twenty-five per cent. in the quantity and value of the grass crop for some years in succession. This will be the case in more than seven lots in ten, and if, in some instances, the result is satisfactory, it still holds good, as a general rule, that it would have been far more satisfactory had the grass seed been sown alone.

It is clear enough on a moment's reflection that a grain crop of any kind, the oat especially, draws from the soil the nutriment which is essential to the early life and growth of the grass. The result is a feeble and tender root, and an equally weak and sickly stalk. If here and there a delicate plant struggles along till a July sun, when the grain is cut and the shade which has enfeebled its growth is suddenly removed, the chances are that it will quickly yield to its fate and die. But myriads of seeds have done less even than this, and died from want of the food which the grain has robbed them of, almost as soon as they germinated. The loss and waste of grass seed, by this course alone, is perfectly enormous. One would suppose that seed costing from three to five dollars a bushel, like orchard grass and Timothy, or from six to eight dollars, like redtop, would be husbanded with greater care.

Now nothing is more true than that the grass and hay crop is the main stay of our farming. We are greatly dependent upon it. Moreover, it is admitted by the wisest and most experienced farmers among us, that a grass farm and the production of hay is about the most profitable branch of agriculture in this State. Why then, should not our grass seed, for which we pay so much, have an equal chance for life and strength of growth with our other and less expensive seeds? Why should we smother so large a percentage of it out of existence and deprive the remainder of the vitality and vigor which a free growth in the sun and the exclusive use of all the elements of its life and health in our stingy soils alone can give? We are not apt to be so improvident in smaller things; why should we be so in this, that has so important a bearing upon the great staple of our farming industry?

I am prepared both from experience and observation to say and to maintain,—

1st. That early fall seeding without grain should be adopted in practice in preference to seeding in spring.

2d. That, as a general rule, it is poor economy to take any grain crop either with or immediately preceding the seeding down to grass. That the grass being the ultimate and paying crop, it is bad practice to reduce the land by the draught which a grain crop makes upon it.

3d. That wherever from any local reason it becomes desirable to take a crop of spring grain, it is more economical to sow the grain alone in spring, and to plough up the stubble and sow the grass seed alone in the early fall.

4th. That in cases where it seems desirable to sow grass seed in spring, it is better to sow it alone and let it take its chance, without compelling it to struggle for existence under the disadvantages of a grain or any other crop.

5th. That in seeding down in August or early in September we are following nature as to time, and that, unless the ground is already rich and in high condition, it is necessary to give the seed the benefit of an application of manure on or near the surface to which the seed is applied.

6th. That in the selection of seed for mowing lots and hay, we should choose varieties to mix that blossom at or nearly at the same time, and not mix very early and very late varieties together.

These propositions are clear and easily understood. I believe their adoption and application in practice upon every farm in Massachusetts would largely increase the grass and hay crop and materially promote the prosperity of our agriculture.

Among the noticeable features of the year was the visitation of the *Epizoötic Aphtha*, or Foot-and-Mouth Disease, which at the time of my last Report had already appeared at certain points and excited considerable alarm. Fortunately the facts in regard to it soon became known, and prompt action was taken for its suppression. The Report of the Commissioners on Contagious Diseases among Cattle, giving a full account of the introduction and spread of the malady, will be found on page 244, to which reference is respectfully made.

PUBLIC MEETING OF THE BOARD

At FALL RIVER.

The public meeting of the Board was held in the city of Fall River, on Tuesday, Wednesday and Thursday, November 21, 22 and 23, and was attended by most of the members, as well as by quite a number of the farmers in the vicinity, though the number was not so great as it probably would have been in a more rural neighborhood.

The meeting commenced at twelve o'clock, on Tuesday, in the Music Hall, generously offered by Dr. DURFEE for the use of the Board. The Board was called to order by Dr. DURFEE, as Chairman of the Committee on Meetings, who delivered the following address.

Gentlemen of the Board of Agriculture:

I understand it is customary on this our public meeting, for the Chairman of the Committee of Arrangements to call the meeting to order, and in his introductory remarks to refer to such branches of industry, as may be calculated to give interest to the occasion.

I can say, gentlemen, it gives me great pleasure to welcome you, and each of you, to our county, and especially to this our city. I see among you many strong and tried friends of agriculture, those who have been laboring for years to extend a knowledge of this most important science among the yeomanry of the State. And I rejoice to know, that you have not labored in vain, nor spent your strength for naught. You are permitted on this occasion to witness the fruit of your labors, and rejoice to know that Massachusetts among other beneficent institutions, has an Agricultural College, which has already proved an honor to the State.

I might also speak of the many county societies and farmers' clubs, which are diffusing intelligence among the masses. You will expect, however, that on the present occasion I should speak more particularly of my own county,—the county of Bristol.

In respect to the fertility of its soil, it does not compare very favorably with many other counties in the Commonwealth. We have a great variety of soil, capable of a high state of cultivation ; but from various causes it has been much neglected, and large tracts of land have been left to run to waste, and have become almost valueless.

From my early knowledge of the habits and pursuits of my ancestry, I can call to mind the indolent and inactive life they pursued. They had no relish for the cultivation of the soil any further than their own immediate wants. The farm of four hundred acres, on which a large portion of this city is built, produced less than what is now produced on many a farm of less than fifty acres. The very grounds on which my residence now stands, at one period in my remembrance, was reputed too poor to raise even white beans, and I have seen on the adjoining land a crop of grass so light that it was difficult to find it when mowed. These same lands have yielded the past year more than three tons of hay to the acre.

For a long series of years, the progress of agricultural science has been very slow, and even now the principal pursuits of our county are manufacturing, whale fishery and the mechanic arts. We have had in the past among us many strong and ardent friends of agriculture,—men who were willing to devote their time and means to promote its interest ; but a large majority of the community have been disposed to shun all participation in the cause.

I cannot, however, forget on this occasion, one who was widely known as a strong and persistent friend of agriculture ; and perhaps no man in our county did more to inaugurate new measures to advance the interest of the Bristol County Society than this man. I refer to the Hon. J. H. W. Page. He was truly my friend. It was mainly through his influence, that I was first led to take an interest, and finally to become identified with the management of the society.

At the time I became acquainted with the society (there being at that time only one society, the Bristol County), we had no fixed location, although for the most of the time our annual gatherings were held in Taunton.

In 1854, the Horticultural Society of New Bedford gave our society a cordial invitation to meet with them, engaging on

their part to use their influence to promote the interest of the fair, at the same time our society was to receive the entire proceeds. The union of horticulture with agriculture gave a new impulse to the society, and the exhibition proved very successful in creating a new interest, as well as in a pecuniary point of view. Our society received quite an addition to its funds, and from that time horticulture has been quite an important part of the exhibition.

I wish here to notice the influence which has been exerted, in advancing the interest of horticulture and floriculture by the example of the late Hon. James Arnold of New Bedford. What little taste and passion I ever had in these branches, was first created by visiting his beautiful garden, and there meeting the proprietor, who seemed to take as much delight in exhibiting the beautiful, as I could in witnessing. From that time I resolved, if life and means were granted me, I would one day enjoy a like treasure and afford to others the happiness I then enjoyed.

It is but a few years, since there was much taste manifested for fruits and flowers in this part of our State. I cannot call to mind a solitary garden, until within thirty years, where a greenhouse or a grapery could be found, or where you could find a pear orchard. Apple-trees have always been abundant, and cider a favorite beverage from time immemorial. We have now in various parts of our county many thrifty and flourishing pear orchards, and in many instances they are becoming a source of income to the proprietor. Almost every family is desirous of planting a few fruit-trees as an appendage to the dwelling. Many persons are turning their attention to the cultivation of grapes, with much promise.

I could speak of the success which has attended the cultivation of peaches, and any man, at quite a small expense, can be assured of an abundant crop. My peach house for twenty years has been in successful operation, and has never failed in a single year. They are more easy to be managed and at much less expense than grapes. The quality depends, in a great measure, upon giving them free air and a genial sun.

The success which has attended the cultivation of foreign grapes is well known to many present, and as to the quality, I hope to have the pleasure of submitting that to your judgment.

On the increased prosperity of our society we soon became agitated with the question of a permanent location, which eventually led to a division, and the central society was organized. Of the wisdom of this measure I have nothing to say; but I am entirely satisfied it has promoted an increased interest in the county, and that either of the existing societies is doing more for agriculture than would have been done if the division had not occurred.

I have always found it difficult to make our capitalists realize the importance of agriculture as the foundation of our prosperity. They cannot or will not perceive the rapid growth of our country under the combined influence of agriculture and manufactures. Divorce these two great leading interests of our country, and we should soon pass back to an age of barbarism.

No community ought to feel more the importance of increasing the products of the soil, than the community where we are; it is the source of our life; from it we receive our daily bread. And yet, what encouragement is held out to that man, who by constant toil is now producing four tons of hay where formerly scarcely one was received? Or what credit would that man receive, who from apparently worthless and cast-off land, covered with rocks, snags and tussocks, should present to your view a beautiful meadow of twenty acres, destined ere long to produce fifty tons of hay? And does it not speak well for the progress of agricultural science, that in our county one man can testify that within the period of twenty years, more than forty acres of swampy, rocky land, hardly worth the name of an owner, has been brought into successful cultivation?

And perhaps nowhere has the power of example been seen and realized, how speedily it exerts its influence on some neighbors, and how readily, almost unconsciously, they are found removing those obstacles to cultivation which have remained for generations, than with us.

It cannot be denied that in our county, as well as in other parts of our Commonwealth, there has been within a short period a material advance in agricultural science, and this is exhibiting itself, not only in the drainage and clearing of land, but also in the beautifying of the grounds with fruits and flowers.

As our manufactures increase, the farmers in our vicinity will find more and more demand for those products of the earth which are essential to the support of man and beast. Hay and all kinds of vegetables will find a ready market, and here we shall see the symmetrical working of these two combined interests,—agriculture and manufactures.

As I have intimated before, we are not strictly an agricultural county; our pursuits are in other directions. And while we would not attempt to compare ourselves in this branch of business with other counties, still we think it quite evident that, taking all the branches of industry, it can be made to appear that we need not be ashamed to make an open exhibit. I propose, therefore, to allude to some of the leading interests of our part of the State.

Taking the statistics of the industry of our State, we shall find wherein Bristol County in certain industrial pursuits takes a very decided lead. The whale fishery, which has been prosecuted for so many years with such success, is in a great measure confined to our county, and more particularly to New Bedford. The aggregate value of production from this source, was six million fifty-seven thousand four hundred and sixty-nine dollars ($6,057,469), while the whole production of the State was only $6,618,670; showing the product of our county to be within $516,200 of that of the whole State.

We will take another product which is nearly allied:—

Sperm, whale, lard and linseed oil—	Whole product, . .	$5,604,761 00
	County of Bristol, .	4,227,970 00
Manufacture of copper, . .	Whole State, . .	$3,577,672 00
	County of Bristol, .	2,295,772 00
Metal sheathing, . . .	Whole State, . .	$954,610 00
	County of Bristol, .	601,772 00
Britannia ware, . . .	Whole State, . .	$419,033 00
	County of Bristol, .	377,033 00
Tacks and brads, . . .	Whole State, . .	$660,516 00
	County of Bristol, .	609,350 00
Shovels, spades, forks and hoes,	Whole State, . .	$1,150,267 00
	County of Bristol, .	1,103,550 00

You will notice in the last product referred to, almost the entire product of the State belongs to this county, at least within less than fifty thousand dollars. We might refer also to that of britannia ware. We will now sum up these *seven* of the leading products of the State, viz.: whale fishery; sperm, whale, lard and linseed oil; manufacture of copper; metal sheathing; britannia ware; tacks and brads; shovels, spades, forks and hoes; and we shall find that they amount to the sum of fifteen millions two hundred seventy-two thousand nine hundred and twenty-one dollars, while for the whole State the amount is only $18,985,530,—within $3,712,609 of that of the whole State.

I can mention other products in which this county exceeds any other in the Commonwealth,—flouring mills, corks, nails, manufacture of cotton. The facts as to this last product, I trust, will be made very plainly to appear before I close my remarks on the present occasion.

I design to speak of the early history and rapid growth of our city. There are many interesting incidents connected with the original transfer of this territory by the aborigines. I could speak of the Freeman's purchase and Pocassett purchase, all embraced within the circuit of a few miles from where we are, and the paltry sum paid for them in pots and kettles; but these noble warriors have passed away, and but few traces are left to perpetuate their memory. Their names, however, are attached to many of our noble structures, erected from the very material they once delighted to dance upon in their war songs. Among the early inhabitants of this place were the Bordens and Durfees. They were at one time (1680), almost the entire proprietors of what was called the Pocassett purchase, which included nearly the whole of the then town of Tiverton. The Bordens, as early as the year 1714, owned the lands on both sides of the stream, together with all the water power.

And it is a remarkable incident, that this most valuable water power remained unimproved (with the exception of saw-mills, grist-mills and a fulling mill), for the period of a whole century,—from 1714, the time of the purchase, until 1814, when the Troy and Fall River Companies were incorporated. The town of Fall River was set off from Freetown, February, 1803, and incorporated by the name of Fall River. The first town meeting was called by my father, Charles Durfee, April 4, 1803.

The next year (1804), the name of the town was changed to that of Troy. This name it retained for thirty years, when it was changed again to Fall River, and became a city in 1854.

In the year 1814, the time when the Troy and Fall River Companies were incorporated, there were thirty dwelling-houses and two hundred inhabitants.

In 1840, the cotton mills had increased to eight in number, in which were run 32,084 spindles and 1,042 looms, what we should say now would constitute a medium-sized mill. The population at this time had increased to 6,738.

From 1840 to 1860 the mills had increased only to eleven in number, containing 192,620 spindles and 4,576 looms, and the population had increased to 13,240.

We have the complete statistics of the cotton manufacturing of this place as published May 1, 1868, when we find twenty-four incorporated companies with a capital of $6,405,000, 507,900 spindles, 11,500 looms; hands employed, 6,759; number of yards per annum, 114,364,000, or 64,977 miles, which would encircle the earth two and one-half times; coal, 32,482 tons; cotton, 23,273,000 pounds; oil, 47,990 gallons; starch, 636,600 pounds; pay roll, about $200,000 per month. Population in 1867, 21,181; population in 1871, 28,000.

To the above should be added the following mills, either erected or in process of erection :—

MILLS.	Spindles.	Looms.
Wampanoag Mill,	25,584	586
Durfee Mill, No. 2,	47,104	1,073
Stafford Mill,	34,928	780
Slade Mill,	31,480	704
Davol Mill, No 2,	16,688	287
King Philip Mill,	32,686	582
Weetamoe Mill,	32,016	732
Narragansett Mill,	25,000	320
Granite Mill, No. 2,	44,672	984
Merchants' Mill (additional),	32,076	644
Osborne Mill,	30,000	720
Montaup Mill,	20,000	480
Chace Mill,	40,000	950
Borden Mill,	50,000	1,200
Tecumseh Mill, No. 2,	22,000	500
Crescent Mill,	25,000	600
Fifteen new mills, containing	509,232	11,072

Recapitulation from Statistics of 1868, *May* 1*st.*

24 mills.	507,900 spindles.	11,500 looms.
15 "	509,232 "	11,072 "
39 mills.	1,017,132 spindles.	22,572 looms.

Assuming that the fifteen mills in process of erection will cost per spindle about the same as the twenty-four already in successful operation, we shall have a capital of about thirteen millions employed in the cotton manufacture. Six other mills not fully decided upon, will probably be erected during the coming year.

The question will naturally arise, and has been often asked, Whence this large capital? Surely not accumulated fortune from abroad has wrought these wonderful changes; it has all been accomplished by the silent, irresistible force of muscle and brain, which never fail in whatever they attempt.

From the commencement of what has now become such a wide-spread and unsurpassed extension of business, it has been a home work. We have had some among us who have matured their plans, and then, in a quiet and intelligent manner, bent all their energies in their prosecution; always adopting the motto, *never fail.*

I will cite, for instance, the Fall River Iron Works Company, which commenced its operation in 1821.

Eight individuals of limited means formed a joint-stock company, fixing their capital at $24,000, dividing their stock into thirty-two shares, at $750 each, equally between the eight owners. They commenced business in 1822; their first assessment was twenty-five dollars on the share, at which time two of their number received appointments, one as agent and the other as an associate agent, with a salary to each of $1.25 per day. We have no record of any change of salary until 1839, seventeen years. In 1825, the first meeting of which we have any record, they were organized, and became incorporated, with a capital of $200,000. At a meeting in 1828, certificates of stock were issued. In 1831, three of the original stockholders had retired, having sold their stock to their associates at cost and interest.

In 1833, Richard Borden, agent, was instructed to build suitable buildings for the purpose of printing calico.

In 1837, September 12, Holder Borden deceased at the early age of thirty-eight years. He was the leading agent in all these contemplated plans, and it was by his advice that this lately organized company embarked in the extensive business of calico-printing. Although the youngest of the eight, he was the first to fall; but he has left his mark upon the enterprises of this city which time can never efface, and his mantle has fallen upon others. One only remains of the noble eight; he yet stands among us as a wise counsellor and a safe guide.

In 1845, January 29, the Iron Works Company obtained a special Act to manufacture cotton cloth and prints, with a capital of $1,000,000.

June 9, 1845, the company made its first dividend, it being two hundred and fifty shares in the Fall River Branch Railroad. The Metacomet mill, of about 24,000 spindles, is the profits, in twenty-four years from organization, of the Iron Works.

You have this corporation, which commenced its existence in 1821, now presented to you in its limited operations, having extended its means to found another corporation, the American Print Works, with a capital of $360,000, printing 56,250,000 yards per annum; using $600,000 worth of madder and garancin, and $400,000 worth of other drugs and dyes; consuming 18,000 tons of coal, and employing 900 hands. The value of its annual production is $5,000,000.

Thus, gentlemen, I have presented to you in a very imperfect manner some of the features of the agricultural interests of our county; also our relative position in industrial pursuits; and lastly, in a brief sketch, the great leading interest of this part of our State; and happy shall I be if, in my remarks, I have said anything which will show this subject more clearly, and bind together more strongly these two great leading interests of our country, Agriculture and Manufactures.

The Board then adjourned to two o'clock.

Afternoon Session.

The Chairman announced that the subject for discussion was

THE PREPARATION AND SEEDING DOWN OF LAND.

Mr. Johnson, of Framingham. It will be remembered by you all, that at the annual meeting in Boston last year, I presented a report upon the time of cutting and the mode of curing hay; and as it seems to me important that that subject should come first in this discussion, I may be permitted to say a word or two upon it.

By the statistics, I find that the neat stock of this country is increasing at a greater ratio than the grass; not that the grass crop is falling off particularly, with the exception of the last two years, but the neat stock is increasing rapidly. Now, it is essential that we should have the grass, or something to take the place of that grass or hay, to keep up our stock. In 1865, the value of the hay in the Commonwealth was nearly $14,000,000; and if to that be added the value of the grass in our pastures, it exceeded all the other agricultural products of the Commonwealth, showing that the grass crop is the most important crop that the farmer can raise. Hence the necessity of thorough preparation of our land for the reception of the seed of all the varieties of grasses both for mowing and pasture land.

Now, gentlemen, at the time the report to which I have referred was made, it was thought by some that the Board were responsible for it. For what I say to-day in regard to the hay crop, I am individually responsible; and I will repeat what appeared in the original report, that if the grass were cut at the proper time, and cured in the proper manner, there would be millions of dollars saved to the farmers of the Commonwealth in hay; because, if there are $14,000,000 of hay cut annually in the State, and if, as I believe, from the experiments I have made, hay that is cut at the proper time, and dried just enough to keep,—which will be done in three or four hours,—is worth one-sixth more than hay which is dried as it was when I was a boy, you will see at once that there is a great inducement to cut and cure our hay properly, as I consider it.

The first thing which a farmer must do in order to increase his hay crop is, to look to his manure. We cannot prepare the ground for seed properly unless the manure heap is cared for. That is the first thing. Then it is important that we should plough our ground properly, that it may be in a suitable condition to receive the manure and seed. If the ground is not ploughed to the depth of seven or eight inches, possibly nine, we cannot get a surface cultivation so thorough that the roots will not be liable to dry up. We cannot get mould enough (to use that term) by shallow ploughing, to insure our crop against the dry seasons of our New England climate. And it is also essential, as every farmer well knows, that we should have a proper quantity of manure, in order that the sod may have plenty of food, and that we may have a paying crop of grass. It does not pay, in Massachusetts, to mow ground where we do not get more than ten or fifteen hundred pounds of hay to the acre, high as labor is now. I should say, that on most soils, about fourteen cords of compost manure should be applied to the acre in planting the ordinary farm crops preparatory to seeding our grass lands.

There is a great difference in the kind of plough which we use for cultivation. I have used various kinds of ploughs, and while I do not intend to give the preference to any kind here,—for there may be plough manufacturers present, for aught I know,—I will say, see to it that you plough the land in such a way that it leaves the centre of the sod a little like the back of your hand. Don't plough until the land is dry enough to work light and pliable. I think a great deal of injury is done to the crop by ploughing early in the spring. Never plough until the soil is ready for it. Better plough in June and plant in June, than to plough and plant before the soil is dry enough, as I have said, to work easy, light and pliable. I would be cautious about the plough that I used, as that is very important. We all know, that it requires a longer time to prepare the land to receive the manure and seed, when we use one kind of plough, than it does when we use another kind.

After I have ploughed I use a roller, or an old-fashioned bush harrow, so that all the little spaces may be filled, and that the manure, when it is applied, may be spread evenly all over the surface. After it has been thoroughly harrowed or cultivated

with the cultivator or horse-hoe it is fitted (the manure having been put on) to be marked out and the crop planted. Then it becomes necessary again, in order that the ground may be in a proper state for seeding next year, that attention should be paid to keeping it free from weeds. Some farmers this last year thought, when they had hoed their corn once, or put the cultivator through two or three times, that they had done all that was necessary; the consequence was, the ground was full of weeds, and they had a small crop; and next spring, when they come to seed, we all know that the ground will not be in proper condition to receive that seed.

Ground that has been planted and is to be seeded the following spring should be ploughed in the fall, after the crop has been removed, that it may receive the action of the frosts, and be better prepared for the spring seeding. Again, the stones should all be removed; or, in preference to that, I would recommend that they be sunk in the ground, unless it is very stony and gravelly. Stones are no disadvantage to a crop. Under this plan, when it comes spring, our work is simply to go forward and replough two or three inches less in depth than when we turned over the sod. That is my opinion. I am not laying down any particular rules, but I hope you will all try this. I would plough about three inches less than I ploughed in the spring when I turned over the sod, because I think it best that the sod should remain at the bottom for the present. Then my practice is, to go over the ground with a harrow. After the harrow, I put on a one-horse plough, going about three inches deep. Plough it fine, and if grain is to be sown (and I would recommend sowing grain in the spring for the benefit of the grass seed), sow upon the furrow, harrow, sow grass seeds, bush and roll. That prepares the ground, so that it is all ready for the mowing machine to pass over. A pair of horses may trot over that ground, and you do not dull or break your knives. It is all ready for the horse-rake to follow, and that goes smoothly, and is not so liable to injure the grass roots as where the ground is left in an uneven state. I have thought many times that the spring-tooth horse-rake is very injurious to the crop of grass the year following, for the reason that it breaks off a great many of the roots of the grass, especially of herdsgrass. It breaks off the little bulb of the herdsgrass, and when

that bulb is broken off, you get no more grass from that root. Therefore, although I am in favor of about all the agricultural tools now in use, I am inclined to object a little to the horse-rake. I think we may find some machine to rake our hay that is better than the spring-tooth horse-rake, although I have used one for many years.

Now, if we plough our ground slightly, cultivate it slightly with a harrow, give it no pulverization, plant it, hoe it carelessly, and then seed it down, when we come to mow, the knives of the machine are dulled by the dirt and broken by the stones, the teeth of the horse-rake scratch up the dirt with the hay, and it is rolled over and over in the winrows, and gives us just what we don't want in our hay. It wears the teeth of the cattle, and is a dirty mess to feed, and they don't relish the hay as well as they do good, nice, clean hay, well cured, and cut early.

For mowing, I should not recommend the early grasses to be mixed with the late. If not mixed, the grasses usually sown will be in blossom very nearly at the same time, and you can cut and cure your hay so that there will be no loss on either kind of grass; whereas, if you mix the early and late grasses, when the late are fit to cut, of course, the early will be in too advanced a state to make the best hay. But for pastures, I should decidedly recommend a mixture of the early and late grasses, and quite a number of varieties, as the early will come forward and mature before the others, which will come in in their turn, and thus the cattle will have later pasturage than the early or late grasses alone could afford.

I think a great mistake is many times made by covering the seed too deep. Many farmers harrow their seed in, and a great deal of it never germinates. I would recommend the covering of grass seed as lightly as possible, never using a harrow to put in the seed. The object of farmers should be to obtain the greatest income from their lands with the least amount of labor. Now, the question is, In what way can we do that? There is no doubt in my mind that the grass crop is the most profitable crop that we can grow in the eastern part of Massachusetts, at least, except in the immediate vicinity of our cities, where market gardening would pay best, and to get that grass crop at the least amount of labor should become our object. But it cannot

be done by planting in the spring, with corn and potatoes, and the common field crops. We should make a change in our mode of farming; and may it not be made, in some degree, by seeding down our lands in the fall, and especially as we have had two years of very dry weather, making our old fields almost barren? There are many fields, acres upon acres, in Framingham, that are covered with wormwood, and not a root of grass apparently left. I have noticed the same thing existing in different parts of the State. We cannot afford to wait for all this land to be ploughed and planted and re-seeded according to the usual process; it takes too long; too much of it would be waste. We must therefore bring that land into grass in some speedier way.

Now, there are many acres that could be re-seeded this fall, before the ground freezes up; and perhaps that is the most profitable way at the present time, to commence on the ground by ploughing and re-seeding this fall, just as the ground freezes. There is no doubt, however, that August is the proper time for seeding our grass lands. That seems to be the time when nature distributes her seeds, and I think grass seed succeeds better when sown in August, than in any other month. I should recommend seeding in August; but to do that we must hasten our haying, in order that we may prepare the manure heap, attend to the ploughing, etc.; and it is a great advantage to the farmer to get his haying all out of the way, at least by about the tenth of July. His meadows may be left a little longer, but no English grass, in my judgment, should stand later than the twelfth of July. This last year, in my section of the State, the English grass that stood later than the tenth of July, was not worth as much as that which was cut at that time. Now, in fall seeding, it is essential that we should plough pretty deep. Many farmers, for August seeding, plough shallow, manure, harrow slightly, and sow the seed, and the first thing they see is the grass starting up from the old roots; the ground becomes nubby, rough and uneven, and if the next season is dry, its yield is very small and about run out. I think the ground should be ploughed at least from seven to nine inches deep, and thoroughly pulverized, before the manure or the seed is applied. And in ploughing in August, if we cut our hay in good season, we plough in quite a heavy grass crop, which, of course, is no disadvantage

to the crop of grass that follows. The soil should be thoroughly cultivated and stirred with the harrow or cultivator, or something of that kind, until it is made perfectly fine, without bringing up the old sod. It is the same with the soil, I suppose, that it is with all sorts of drugs. We are told by the apothecary that the more we rub this or that down, the more strength we get out of it for medicine. I take it, it is just so with the soil. The more we mix it and work it, the greater will be the strength of the soil, and the greater will be the crop that we take from it. Therefore, it is important that we should follow up the plough with the cultivator or the harrow, in order that the soil may be thoroughly pulverized. The manure also must be made very fine, and allowed to decompose before applying it, so that the little roots may take hold of it readily when the grass springs up, and not be obliged to wait until that manure becomes decomposed in the soil; if they are, the plant will be weak, and the crop light.

There seems to be a proper time for ploughing, although we have got to do it as the man cut his hoop holes,—when he had an opportunity. Still, I should advise ploughing, as far as possible, when the dew is on the ground. I am aware that it will not do for the farmer to wait to plough all his ground when the dew is on; still I would advise him to plough as early in the morning as possible; and if there are any young farmers here, I say to them, depend upon it, if you plough early in the morning, you will gain in the crop, you will gain in every way during the day. I have noticed in my garden, that that portion which has been hoed or cultivated with the dew upon the ground, produces better crops than that portion which was hoed in the heat of the day; and I have no doubt it is so in the fields. In fact, if you plough a strip of land with the dew on, and another later in the day, and wait a week or ten days, and then replough, you will find a difference in the soil as you turn it over.

Clay soil should be ploughed when it is quite dry, so that it may be easily worked. If clay soil is ploughed too early in the spring, when it is wet, it will bake and become hard, and it is difficult to work it up into such a state that the roots of grass or grain can take hold of it. It must be worked, I repeat, when it is dry; if not, it will be full of little lumps, which will

lie there the whole season, until it is subjected to the action of frost. Gravelly land, of course, can be ploughed almost any time. Still, there is a proper time to plough even gravelly land.

If we cannot prepare the ground to seed in August, I would recommend that the seeding be passed over until just as winter sets in, so that the seed cannot vegetate until spring. I am aware that, where the ground is sowed late in the fall, weeds spring up and give some trouble in the haying, which they will not be likely to do if the ground is seeded in August; still, I think it would be better to seed it then than to let it pass over until spring.

All lands, whether seeded down in the spring or in the fall, should be rolled in the spring, and every spring. I believe in rolling all grass land in the spring. The action of the frost throws up the ground, and the little roots are inclined to remain out of the ground and dry up; they want pressing back, and by the use of the roller, we place them all back again. I think that we get great advantage from that, and that we are trebly paid for the labor of rolling our grass land in the spring.

Drainage on most of our grounds to be seeded, or planted to any crop, should not be lost sight of; but, as I am informed that there is a gentleman in the hall who will speak upon that particular point, I will say nothing in regard to it.

I think, gentlemen, that it is important, as the last two years have been very dry, that we should seed down more land than we can get into grass by the use of the plough. Therefore, I would recommend the use of a spiked roller, which is used quite extensively in England, and somewhat, perhaps, in this country. This spiked roller can be used on all kinds of land, rough or smooth, clay or sand, and it brings up a certain portion of the soil; then, by taking a brush and going over it, seeding, putting on finely composted manure, and rolling it again, we get a nicely re-seeded field, and we may expect a good crop from it; and the operation is much cheaper than it is to use a plough. Or, if you have not got a roller, use the Nishwitz harrow, which goes on several little wheels, and cuts the ground in fine slices. By going over a field two or three times each way with this harrow, you pulverize the soil very finely, and the use of the roller again makes it all smooth. It seems

to me that, situated as we are at present, that would be the best way to re-seed those fields, now so numerous that we cannot cultivate them and bring them into grass again under the old system.

I would also recommend clean culture along the walls. It seems to me very important that we should cultivate up to the walls. Nothing looks more slovenly on a farm than weeds and bushes growing by the walls of our mowing fields and pastures. I believe in large fields for mowing lands and small pastures. By having small pastures, we can change our stock oftener, can keep more of it, and can get a greater income than where they have large ranges.

I believe that a thorough pulverization of the soil will pay just as well, proportionately, as labor will upon butter. For instance: we have farmers who have sold their butter this last year in Boston market at twenty-five, twenty-seven and twenty-eight cents a pound. That was all they could get for it. The market-men told them it was all they would give. It was all it was worth; it was not very good butter. They had not put labor and care enough into it. They had been so afraid of work, that a gimlet-hole had to be made in the box to draw out the buttermilk. Yet right by the side of these there are farmers in my own town who have sold their butter in Boston market for seventy-five cents a pound, through the season; and they don't go to the Parker House to board it out, either; they go and take their money when they want it. They do not put more than seven cents a pound more into that butter, in the shape of labor, than those men who have taken twenty-five or thirty cents a pound for their butter. I remember, some four or five years ago, that a gentleman doing business in Boston, living in Framingham, said to one of the farmers, "If you will put five cents a pound more of labor into the manufacture of your butter, I will guarantee fifteen cents more a pound for it than you have been getting." That is, the amount of extra labor which he would put into it would make it of that quality that people would want it. It is just so with the soil. It is the labor which you put into that soil, the working it over and pulverizing it thoroughly, which, with a fair amount of manure, will make it ready for the crop, and insure a yield which will abundantly satisfy the farmer, and by this mode of cultivation

he will grow rich. Any farmer can well afford to give his land thorough culture and a liberal dressing, but we must not undertake to do too much in a season. Labor is quite an item at the present time; it is both high and poor. The fact is, the laborer has become master; the employer must be the servant in most instances. I have usually called upon my help mornings, and I must say, some of them have not been the pleasantest looking men I have seen, when they made their appearance, although I had made them a pleasant call. I believe in commencing work early in the morning, and leaving early at evening.

Some farmers have bog meadows, which have been worked to some extent, and such land produces well when thoroughly reclaimed, but it takes a great amount of labor to do it, and to do it in that way (as the saying is) that it will stay done. The process is, as you all know, by ditching, draining, burning, etc., and if top-dressed once in two years after seeding, it makes the very best of grass land. Then we have certain kinds of wet ground which is very full of rocks and stones, and cannot well be ploughed. In some instances, we have used the spade,—a common, narrow Irish spade. I know that it is expensive, but I had, and have now, some land which needs the spade; it is about impossible to plough it. I spaded two and a half acres of that ground, at an expense of $42.50 an acre; the land cost me $45 an acre; and the first year I cut 5,995 pounds of hay to the acre. I don't remember what hay was worth at that time, but it more than paid the expense. Certainly it will pay to spade these rough pieces of land that cannot be very readily ploughed, if the soil is good.

It is true that farmers are obliged to live rather short and work pretty hard, but many of them acquire a good property. The farm is really the farmer's bank, where he makes his deposits, and it is done with the strictest economy, and the very hardest of labor. I remember reading, a few years ago, of a gentlemen in Middlesex County who had fifty apple-trees to set out, and being called away on the day he desired to have his trees set, he directed his gardener to go to work and put them out. When the gentleman came home, he found that the man had set out only ten trees, and complained because he had done so little. The next day, he worked with his gardener,

and they set out all the rest—forty trees. Ten years afterwards, he stated publicly that those ten trees that the gardener set out that day were worth ten times as much as the forty trees he set out in one day. This is but an illustration, gentlemen, of the fact, that it is by care and attention to the products of the soil that we can hope to realize satisfactory and profitable results. If we wish to make men and women of our children, we must give them care and attention in their childhood, and bring them along step by step as they increase in years. But, gentlemen, I see before me some men of high culture, and this part of the subject I shall of course leave to them.

With these remarks I leave the discussion to others more able than myself.

Mr. Goodman. I merely rise to say that Col. Waring, of Newport, whose name appears on the programme for to-morrow, to open the discussion on Farm and Garden Vegetables, supposed, through some misunderstanding, that he was to speak to-day, and is present. As he will not be able to be here to-morrow, I hope that we shall have an opportunity to hear him now.

Mr. Slade. I move that Col. Waring be invited to address the Board at this time. Carried.

Col. Geo. E. Waring, Jr., of Ogden Farm, Newport, R. I. I have listened with much interest to the remarks of the gentleman who has preceded me, on the subject of the preparation of land for grass; and although my intention had been to speak on the subject of the cultivation of garden vegetables as a farm crop,—a most important branch of the industry of this neighborhood,—I think I may be allowed to vary my plan, and to speak also on the question of the preparation of land, not only for grass, but for all crops.

Dickens has said, that that part of the farmer's holding which pays the best for cultivation is the estate which lies within the ring fence of his own skull; and it seems to me, not only that each of us may, in our own operations, derive, in the end, the greatest profit from the cultivation of our own minds, as business men and as farmers, who intend to make use of our best faculties in carrying on the operations connected with our business, but that, as a Board of Agriculture, you, gentlemen, will do more good to the agricultural interests of the State of

Massachusetts, if you give that direction to your efforts, more, perhaps, than you have hitherto done, than if you confine yourselves simply to the promulgation of recipes for doing certain kinds of work. To my mind, what New England agriculture especially needs is not so much to know when, and how, and what it shall plant, as to know *why* it plants, how what it plants grows, &c., in what manner it may be made to grow better, to grow with the least injury to the soil, most in conformity with the needs of the community, and therefore the most profitable.

I am an unmitigated high farmer; if I were not, I would go West; I would go to some place where labor is worth two and a half or three dollars a day, and where land can be bought for a dollar an acre, where an immense amount of skinning could be done, and a certain profit would accrue, without reference to the condition in which I might leave the land. That is not my view. I do not believe that that sort of cultivation will, in the end, give me more money, more comfort, more satisfaction, and certainly not more intelligence. I believe that the best field in America for any intelligent farmer is right here in New England, close by great communities, who must be fed with crops brought from long distances, and where intelligent men, who come in advance of the high cultivation that is sure to follow in a few years, will get the benefit of the very high prices. As an instance, it is a part of my business to grow cabbages, and this city of Fall River is one of my principal markets. Fall River is supplied with cabbages that come from New Jersey. The men who grow them there grow them very intelligently, spend an immense amount of money in preparing their land, and make a great deal of money by it. Before they sell their cabbages, they must load them on their wagons, carry them across the river, paying ferriage, deliver them to the commission merchant, who stores them away in his place, paying for the unloading and stacking up. The commission merchant charges a commission of 12½ per cent. for the sale. He sells them to a wholesale merchant, of Providence, who pays cartage and freight, and cartage again, to get them to his own store, barrels them up, carts them to the "Bradford Durfee," which takes them to Fall River; and here they are sold to a dealer. That dealer will gladly give me the same price for cabbages, out of my own wagon, that he gives for those delivered from the boat. So that

I get not only as much money for my crop as the Jersey man—that is, a fair profit on the cost of raising the article, for no staple article is ever grown many years below the cost of raising it,—but I get the commission of the New York man, the commission of the Providence man, the cost of transportation from New Jersey to New York, from New York to Providence, and from Providence to Fall River, all of which amounts to a very considerable sum,—more, I think, on the average, than the original cost of the cabbages in New Jersey.

This is only one instance. The same thing is true of hay, although hay, as a general thing, is not brought so far, and the cost of transportation is not so great. But hay is worth much more here than in Vermont, where the demand for it is limited. The great demand for hay is to feed the horses that are used in our large towns. So I believe that we should start with that leading principle, that the agriculture of New England, before it reaches its perfection, or anything approaching its perfection, must deal directly with the problem: to raise, not what can be as cheaply and easily brought from the far West, or from any remote district, but what can only be raised right here, or what, being raised here, will save an excessive cost of transportation from long distances; that is to say, something the price of which is regulated by the cost of transportation. I remember that, in 1852, I delivered an address before an agricultural society in the north-eastern part of Maine, 165 miles north-east of Bangor. The land was easily cultivated, very rich, from the burning of the timber that had been cut down in clearing it. The great demand in that immediate vicinity was for food for the lumbermen and the lumbermen's teams; and wheat, of which they were producing regularly about forty bushels to the acre, was worth the price of wheat in Bangor, and that is Western wheat, brought from Ohio and Western New York, with the cost of 165 miles of wagon-hauling in addition; so that, when it was $1.40 in Bangor, it was selling in Aroostook for $2.50. The men who grew wheat in that vicinity, therefore, received an extra profit of $1.10 a bushel, from their position.

Such instances as these may be found here and there all through the country; but, as a general rule, if we go out of the very small circle of what we may call "high farmers," or "fancy farmers," if you please, we find every one growing here

precisely what is grown elsewhere. When I commenced farming in New England, I followed the beaten track. I commenced growing corn, and continued it until I convinced myself thoroughly, that although I could produce from 75 to 85 bushels to the acre, without any very unusual outlay, where the soil is good, I could buy that corn much cheaper than I could produce it. That is to say, the same amount of labor that is expended upon a field of corn, and which absolutely must be expended, if we would get a good crop, will pay very much better if expended in the raising of cabbages or roots. I do not mean to say that it will not pay, ordinarily, to raise corn, but I say that it will pay so much better to raise other things, that we had better, in my opinion, leave corn, as we leave wheat, to those who have more land, smoother fields, and greater facilities for the use of machinery, and devote our land, and especially our manure, to producing that which will pay us more money.

Precisely how the impression is to be produced among New England farmers generally, that they must cultivate in a better way, cultivate more thoroughly, cultivate for better results, it is difficult to say, for there are prejudices among them which, as all who have encountered them know, it is very difficult to remove. I do not believe that anything very effective can be done except by example. We must get certain men, here and there, to do at least a small amount of work in the way that we believe to be best, and by the example of these specimens of good cultivation on a small scale, produce an impression that may have a lasting effect upon the community; for the moment we show that there is a profit in any transaction, that moment we have started a movement that will never stop. Our neighbors may scoff at our processes when we first introduce them; and if they fail (as perhaps they may), they will continue their scoffing; but if they succeed, there is an end to all objection. However stolid they may have been in opposition, they will not only accept the suggestion and follow it out most carefully, but they will firmly believe, themselves, that they have done it all their lives.

Probably nothing better can be done to produce the effect that I speak of than to secure a perfectly good seeding down of land to grass. Any intelligent farmer will appreciate the fact that land that will produce two and a half tons of hay to the

acre, is worth almost any amount of labor or care or money that it may have cost. There is living in my neighborhood, a farmer who has made his own way in the world, who was born and brought up upon a farm, who is not a rich man, by any means, although he has a little money in the bank, who paid $377 an acre for four acres of land in grass, four or five years ago. From that time to this, that land has never been ploughed, nor had anything done to it, except that he has kept it well top-dressed with seaweed, and he told me the other day that it was one of the best investments he ever made, for notwithstanding the high price, the crop of grass was so good, it always gave him satisfactory interest for his money. Now, the secret of the fertility of that field lies simply in the fact, that it was for many years an onion patch. It was thoroughly cultivated, and so put into a condition that it will never forget. So long as it receives a sufficient top-dressing, it will probably remain in grass year after year. Now, what we want to know is, how to make all land on which we produce grass, onion fields. It does not cost much. If we cannot take the land in its present condition and cultivate it and manure it, simply for the sake of the grass, let us put it into some crop that will pay for more thorough cultivation and manuring, and bring it in the end into a condition where it will produce two and a half tons of hay to the acre. I believe much more is possible, on good land, but that is enough for a good profit.

In commencing the preparation of land in this way, no matter whether our intention is to plough it and seed it directly and bring it into condition by the use of manure, or to improve it gradually by a long period of cultivation, the first thing we must look to is draining the land; and as the time is short, I will confine myself entirely to this branch of the subject. Everything else connected with it you all of you sufficiently understand: the importance of manure, the importance of thorough cleanliness, and all that. But it seems to me that farmers generally, not only in New England but throughout the country, fail to appreciate the necessity for thorough underdraining, and do not know exactly how underdraining should be done to secure the best results. There is one almost insuperable objection to this method of improvement, and that is, its very great cost. But the reason why it is so expensive,—

not much less than $100 an acre; $85 according to my experience, if the work is done well,—is because so little of it is done. The tiles must be brought from a long distance, and obtained of a man who sells so few that he is obliged to ask a high profit on what he does sell. Then the ditching must be done by men who are not accustomed to the work, with very common tools, and they make the ditch a foot wide at the bottom, when three or four inches is all that is necessary. All these things conspire to make the cost $85 an acre, where it ought not to be over $35 or $40. But notwithstanding its high cost, wherever draining is necessary, I conceive it to be unprofitable to cultivate the land without it. I have on my own farm, over thirteen miles of drains, four feet deep. Those, I am sorry to say, cost from 85 cents to $1 a rod. But it is a most important and necessary improvement. No matter how rich your land may be, it cannot make use of the riches that it contained originally, or that you have put into it, unless it is in a condition to admit the air, and to allow it to attain a certain temperature, so that vegetable growth can go on without being disturbed. If your crops are to be choked off by water until June, when they might commence their growth early in May, you lose not only the time when the crops might have been growing, but you lose the advantage of early maturing your crops, getting them out of the way of frost, and getting your grass ready to be cut in good season, which comes from the free and ready admission of atmospheric air, and from the absence of evaporation of water from the surface, which retards the growth of the plant, and holds everything, even the chemical processes of the soil, in material check.

There are two or three things in connection with drainage which, if they were better understood, would perhaps tend to a more rapid extension of the improvement. One is, that a very small pipe will discharge a large amount of water. I am frequently appealed to by people living in my neighborhood, to know where they can get a certain amount of tiles, three, four, five, or even six inches in diameter, to lay a few hundred feet of drain. It generally results in their going away and ordering tiles $1\frac{1}{4}$ inches in diameter. In draining an acre of land, no matter how wet it is, if it is wet only from the water that falls on the surface, and not from springs flowing into it from the

adjacent ground, a tile $1\frac{1}{4}$ inches in diameter is sufficient to make it entirely dry. Not only that, but very rarely will more than half of that be filled. Tiles $1\frac{1}{4}$ inches in diameter can be bought for $2\frac{1}{2}$ cents a foot, while tiles three inches in diameter cost three times as much, including the expense of transportation to the land. Here is a difference at once, of at least $20 an acre, in draining an ordinary field.

Then in the matter of digging. Farmers think they must begin by ploughing as deep as they can. A man thinks he has made a great advance if he can plough down a foot and a half deep, and throw all that depth of dirt out by horse power. Then the man who digs the drain must have a wide shovel, and there must be room for him to stand in, and to change his position, if he gets tired, and it results in throwing out great blocks of earth, when perhaps little slices would answer the purpose; throwing out three or four times as much as is necessary, and at a very great cost. The spade leaves a clean, firm bank. The plough a ragged and crumbling one.

Another point where failure is often made is, in the direction that is given to drains. That seems to be a thing in which the human mind is most perversely set in the wrong direction. Ninety-nine out of a hundred, even of those who have given some thought to the subject, if asked to lay the drains on a piece of land, will run them diagonally down the hill so as to catch the water, as they suppose, as it comes down, and carry it off. That is exactly wrong, for the reason that the drains that are to be laid are only pipes that leak at the joints. The water gets into them by coming in at the joints. They are as open on the lower side as they are on the upper side; the water leaks in at one joint, runs along to the next, and then perhaps leaks out. The object should be to get it into the pipe, and offer it an inducement to go out, give it no chance to run in any other direction. It is as impossible to catch the water by laying a drain along a side hill, as it is to catch the water running down a piazza roof by setting up a loose-fitting board; it will run along the board until it finds a chance to get under it, and then it will run on down the roof. A drain should be run *directly up and down the slope*, so that the moment the water gets into it, it will have no course but to follow it to the end. That would be a very simple thing, if all lands sloped in one direction; if there

were no irregular undulations. Of course, it is impossible, in an irregular field, to have the drains run directly down the slope, and at the same time be parallel to each other, which would be the most economical. Drains will work to the best advantage at a certain distance from each other, and the moment we vary the parallel direction, we either draw them too far apart, and have incomplete work, or crowd them too near together, and make the work more costly than is necessary. Consequently, there must be judgment used in laying out a system of drains, to make such a compromise between the up and down hill slope and the parallel lines we desire to have, as shall best accomplish the purpose, without being too expensive.

Of course, in laying a drain, the great point is the question of outlet. Unless we have a good free outlet, from which the water discharges in the open air, not backed up by a stream nor by an irregularity of the ground, there is great uncertainty as to the permanence of our drains. There must be a free flow, so that the silt that is washed into the drain shall be immediately carried away. The outlet being a good one, and the line for the main drain being run along at the foot of the hill, so as to have a sufficient fall,—and by sufficient, I mean six inches in a hundred feet,—and then short drains being laid to lead all the water into the main drain, and have it run freely to the outlet, we are in a position to have the work properly done at reasonable cost; and, if we can get our tiles without difficulty, we may do a sensible, a useful and economical job.

One mistake that is frequently made is, in neglecting to lay a main drain, each drain being allowed to discharge either into an open ditch or out of the side of the hill, so that along the hill-side there are instead of one outlet, twenty outlets, that play the mischief with the drains. They need the utmost care and attention. They afford ready means of access to field-mice and other animals, which get into the pipes and sometimes stop them up. Our work may be very much injured if we do not take care of each outlet; and if we count the cost of a main drain, connecting the laterals, and carrying off all the water to one point, we shall find that the expense will be very small compared with the labor that it will be necessary to give, when no such main drain is provided.

The plan of drainage having been made, the next thing to

do is to secure the tiles. That, of course, is simply a commercial matter, in which no advice from me is necessary.

The next thing is, to prepare for the digging of the drains. And here considerable improvement over the usual methods may very easily be made. In the first place, the idea that a plough must be used is a fallacy; it does not help, it retards the work. It leaves a ragged edge, throws out a great mass of earth, and leaves it in such a way that it is likely to fall back and trouble the drainers afterwards. It commences the drain with a width of two feet, when a width of a foot, or thirteen or fourteen inches, at the outside, would be ample, and we have a crumbling, loose edge, instead of the clean edge that a good drainer always leaves directly at the side of his ditch. Of course, the diggers must be Irishmen, and they must be men who, having been "draining all their lives," will be determined to do it in their own way. But it is much better that they should not be allowed to do it in their own way. They will tell you that they will do the work for so much a rod; and the price may seem reasonable; but it is very much better to hire them by the day, while teaching them to use the new tools, for the work can be done much better and more cheaply with these. I refer to the narrow draining-spade which you have probably all seen. I am doing some draining for a near neighbor, with a gang of experienced men, at sixty-five cents a rod, for a three and a half ($3\frac{1}{2}$) feet drain, and I am satisfied they are making $4 a day. The reason why they make that is because I cannot get ordinary workmen to do the same work any cheaper. If I hire ordinary diggers, they will earn $1.75 or $2 a day, but the work will not be done so well nor so quickly. These men have learned how to use the tools, for they have used them for years. Their first operation is to take the broader of these spades, which is five inches wide at the point, and seven or eight inches wide at the top, and this they drive directly into the ground, to the depth of about fourteen inches, and take out the sod, which shows the round or scooped form of the spade, each end being four or five inches square. This is taken out with a twist, and laid on the bank, with the grass end, not directly against the edge of the ditch, but a short distance removed, which makes a good protection for the earth which is thrown out afterwards, which slides over directly behind it. When they have gone to a depth

which, with the crumbling at the bottom, is about thirteen or fourteen inches, they take a narrower spade and work in the same way, taking out about a spade and a half, lapping a little at each cut, and throwing the dirt over behind the other. Then they are down two feet and a half, and that is usually the lowest point to which their feet go. Then they do the rest of the work with a scoop. They have a long, goose-necked scoop, which is quite heavy and well-balanced, so that by giving it a throw, it may be struck in five or six inches deep. The men continually work backward so that they cut away the ground on which they stand, and when they get to the full depth, the finished bottom is a foot or a foot and a half below where the workmen stand. This work is not difficult, and the saving is so great that I am satisfied that the cubic capacity of the earth removed by a skilled workman with the proper tools, is not more than one-half what a common workman would take out with a common spade, in making a drain of a given length and depth.

Now, what we need is to do so much draining that the number of skilled workmen will increase to such an extent as to create a competition, and then we can get our drains laid for forty cents a rod, instead of sixty-five; perhaps for less. One man, a Canadian Irishman, who has worked for me, and who had learned his trade in Canada, told me one winter he worked in the public park at Hartford, and averaged $3.50 a day, right by the side of the men who were regulating the price,—common Irish laborers, who were ditching in the ordinary way.

The ditch having been excavated with this scoop of which I told you, is immediately graded with the same instrument. As he takes out the last earth, the man carefully smooths the bottom, before he gets too far back to reach it, and brings it to a perfectly uniform grade. Then, when he gets through this part of the work, he lays the tile in it, not by getting down into the drain, and breaking his back in trying to get the tile in its proper place, but he puts a collar on the end of the tile, and then inserts a long-handled iron tile-layer into the collar and lowers the pair to their place, withdraws the iron, takes up another tile, lowers it, inserts it into the collar of the one already in position, withdraws his iron again, and so he goes on, step by step, without disturbing the regularity of the bottom.

Now he does—what? The most important of all things, after great care in laying the tile, is to pack them securely. He puts directly upon the tile the finest, most compact, most clayey soil that he can find, without a particle of vegetable matter,—no grass, no straw, no shavings, no leaves, no anything, except this hard, clayey soil, which is put on to the depth of seven or eight inches, and then gently beaten, to fix it in its place, and make a perfect matrix round the tile, holding it perfectly tight. I believe that one operation has more to do with the permanence of a well-laid tile drain than any other one part of the work. It is very natural to think that if we put a pipe into the ground, we must put some porous material over it, to enable the water to pass through to the tile; so we throw over it brush, or leaves, or something of that kind. That is not the way the water gets into the drain at all; it comes up from below; and in putting this porous material over the tile, the chief end we accomplish is to put there a mass of organic matter, that is sure to decompose and form a fine mould, which will be carried, by the little water which comes trickling from above, into the tiles, and perhaps choke them up, by accumulating at one point or another.

I have said that the water gets into the tiles from below. This idea may possibly be new to some of you, but it is one which is very well established. In a dry season, when it has not rained for several weeks, the soil is dry, not only down to the level of the drain, but for a considerable distance below it. The water table has settled down so that the water level in the wells is perhaps ten feet below the surface. There comes a heavy rain. Now, when the water falls upon the ground, it has no instinct to teach it that there is a drain in a certain direction into which it may get and be carried away; it will simply follow the law of gravitation, and descend into the soil until it strikes the water table, and if the rain continues, the water table rises nearer and nearer the surface, until finally it rises to the height of the bottom of the tiles, and then, as if it had risen to the top of a drain, where it would run over, it runs into the drains and escapes. In my opinion, the idea that water ever, for any considerable distance, travels laterally to find a drain is quite a fallacious one. It is a natural one, but it is a fallacy. It is one that will not hold water.

Dr. Durfee. How near together do you lay these drains?

Col. Waring. Those I am laying now are forty feet apart. Perhaps that is a little further apart than they had better be laid, with a depth of $3\frac{1}{2}$ feet; but on figuring up the cost, as I have to do, I found that was as near together as I could afford to lay them. The rule, so far as there can be a rule for anything about which so little is known, is to put drains that are four feet deep forty feet apart; if made more shallow, as I think they may be, with profit, they should be placed nearer together. The custom in some parts of England, in heavy clay lands, is to make the drains three feet deep and twenty-one feet apart.

It would take too long to discuss the reasons why draining is necessary, and besides, in my experience, I have never found that any amount of discussion as to the reasons why it was necessary was effective. The only thing that farmers want to know about draining is whether it will pay, and if they find that it does, reasons seem to have very little to do with the adoption of the process. I am satisfied, that if it were not for the inordinate cost of draining, if it could be done for fifty dollars an acre, even, most of the land of the island of Rhode Island that needs draining (and that is probably more than one-half of the whole), would be drained by the farmers who own the land or rent it. Of course, a majority of the land of New England does not need draining. I think it was one of the great fallacies of the early teachers of the system, that draining would not only make wet land dry, but dry land wet. Draining will enable heavy, wet land, which suffers very much in summer, to absorb moisture from the atmosphere and so resist the drought; but if a piece of land is already dry enough to have a free circulation of air through it, I doubt if it will be materially benefited by draining.

Secretary Flint. How about the comparative cost of stone and tile drains? Many farmers cannot see the economy of using tiles, when they have plenty of stone on the land which is to be drained. Possibly the Colonel can give us some information on that point.

Col. Waring. I have no question that tiles are much cheaper, even at the high price we have to pay for them now. I have heard it stated very often, by farmers who have tried the

experiment, that they have convinced themselves, that if the stone were delivered to them free of cost, on the bank of the ditch, they would not dig a ditch large enough to accommodate them, and put them properly into it. Having the stone on the land, they would rather buy the tiles to put into the drain than to use the stone.

QUESTION. Don't you think that extravagant?

Col. WARING. No, sir, I do not; because you are obliged to make the drain a great deal larger if you lay stone in it, and your stone must be laid with some care and skill, by a man who is worth pretty good wages. I believe it would cost more to lay a drain four feet deep with stone, if the stone were delivered on the bank of the drain, than to buy the tiles for it and to lay them. The cost of the tiles, delivered in Fall River, for an acre of land, supposing the drains to be forty feet apart, would be just about $25, an acre would require about one thousand feet—sixty rods. Those would be $1\frac{1}{4}$ inch tiles. Now, I think there are very few fields in which you could lay a stone drain of sixty rods, digging the wider ditch you would be obliged to, for $25.

QUESTION. Supposing it is in a locality where you have to pick out a foot and a half of hard-pan to get your three feet?

Col. WARING. I don't see how you are going to get along, if you use stone, without making a wide ditch. You must have it wide enough to work in, and that means two feet at the top and a foot or more at the bottom; whereas, a man can lay a tile drain with the ditch five inches at the bottom and fifteen at the top, if it is only three feet deep.

Mr. ALLIS, of Conway. I can show the gentleman a stone drain that has been down thirty-four years, and the water runs as freely to-day as it ever did.

Col. WARING. I am not objecting to the making of stone drains. I have seen a great many good ones; but I don't believe they are any better than tile drains, and they are more expensive.

QUESTION. Suppose you have the stones on the ground?

Col. WARING. You will find it a great deal easier to cart them off and put them on the side of the road, or dig a wide and deep ditch and throw them into it, if you want to get rid of them. I have tried both methods. I will confess that I

started with the belief that the tile drain is the best and cheapest, but that belief has been strengthened by the experience I have had.

Secretary FLINT. How would it be where you are liable to come constantly, at a depth of two or three feet, in contact with large rocks, which compel you to deviate from the direct line? Would not a stone drain, in many cases of that kind, be better than a tile drain?

Col. WARING. It would be better, in many cases, to get a perfectly uniform bottom, to clear the rocks out.

Secretary FLINT. Suppose they are so large that they cannot be removed, or that you strike a ledge?

Col. WARING. Then the real floor of your drain is going to be the level of the rock, and it is no use to dig below that. Find the lowest point you can get, and then grade to that depth.

Secretary FLINT. In many cases you would want to go lower than the rock.

Col. WARING. In that case, you would have to dig a wide ditch and get them out by main force. But stones as large as a man's body, even, are not apt to interfere with a tile drain. Now and then one will crop out at the bottom of a drain, and you must get it out, even if you have to blast. But if you should take a hundred stones, as large as your body, and put them on the line of a drain within four feet of the surface, the probability is, that nine-tenths of them, at least, would be so high up that you could get your tile under them.

Mr. BENJ. BUFFINTON, of Fall River. I should like to know how you would manage coarse, gravelly soil?

Col. WARING. I should not think it would be necessary to drain such land as that. Is the land wet?

Mr. BUFFINTON. The land is wet.

Col. WARING. Can't you tap that gravel somewhere, and get the water out of it?

Mr. BUFFINTON. That is the reason I would rather drain with stone than tile; you can drain so much deeper. You can dig larger drains, and have them farther apart.

Col. WARING. The distance apart has nothing to do with the size of the drain; if you put in a very small pipe, you will draw the water off from an immense area.

Mr. S. B. PHINNEY, of Barnstable. I would ask the comparative value of stone and tile, side by side. I have used both. I commenced in Barnstable, some few years ago, upon some of the land belonging to the agricultural society there, and I found the stone cheaper than the tile. That was something like twelve years ago, and so far as the drainage to-day is concerned, it is considered better by the stone drains than the tile. Perhaps labor was somewhat cheaper at that time than it is now, but I should like to know how they compare in value.

Col. WARING. I should say that whichever kept open the longest was the most valuable. All you want of either kind of drain is to furnish an outlet for water, and the one which furnishes the most permanent outlet would be the most valuable. In the case to which you refer, perhaps the tile were of the crude kind, that were made in the early stages of the manufacture, and the probability is, they were laid by men who did not understand it, and the dirt has found its way in and obstructed the drain. A perfectly well laid pipe tile drain, with collars embedded in clay, seems to me almost as permanent as the land itself. I do not see any influences that can disturb it. They cannot be worn out by the water flowing through them; they are burned too hard for that.

Mr. JOHNSON, of Framingham. Do we understand that it takes a thousand feet of tile to lay an acre?

Col. WARING. It takes about a thousand feet to drain an acre, with drains at intervals of forty feet.

Mr. JOHNSON. You say it would cost $25 for the tile, and that it would cost more than $25 to lay the stone, if the ditch were dug, and the stone there by the side of the ditch?

Col. WARING. No; I mean that the stone being delivered at the side of the ditch, it would cost more than $25 a thousand feet to make your ditch enough wider to accommodate a good stone drain, and lay the stone in it.

Mr. JOHNSON. I do not doubt that is true.

Mr. BUFFINTON. There is another thing I have thought of, and that is, whether more air could not be got into the soil by a stone drain than a tile drain?

Col. WARING. I do not think much air gets into the soil in any case, by reason of the presence of a drain. When the soil is full of water, and the water is drained away, of course air

follows it. But except immediately over a drain, I don't think there is much ventilation of the soil from it.

Mr. BUFFINTON. So far as my experience goes, over even a stone drain, the soil is more mellow than where no drain has been laid, and better crops are obtained. What is the cause?

Col. WARING. Perhaps it is more mellow merely because it has been improved by digging. I suppose crops have grown stronger there, and have sent their roots further each way, being stronger; then the decomposition of those roots makes that land richer, and enables more roots to grow there; and finally that becomes the most mellow and the richest land in the field, chiefly from the accumulation of organic matter from the decay of roots.

Mr. BUFFINTON. I have almost made up my mind, that if we work the soil and make it light, as Mr. Johnson said, as we do when we make an onion bed, it will be equal to draining it.

Col. WARING. I have no doubt of that, unless the soil is too wet to *stay* mellow.

Mr. BUFFINTON. I have thought if we would work our soil deep, and get it thoroughly mellow and light, perhaps there would be no need of draining.

Col. WARING. You cannot make an onion bed in wet land; in land that really needs draining. All the draining amounts to, is getting the land ready for making an onion bed of it. When that is done, I should not object to any amount of cultivation you choose to put upon it. We agree perfectly about that.

Mr. JOHNSON. I suppose that strong land that is underdrained, will last in grass much longer than a field that is not underdrained, with the same amount of manure.

Col. WARING. Undoubtedly. I believe that a well-drained soil, by suitable top-dressing, can be kept almost permanently in good grass. I do not believe that you can keep the best grasses many years in very wet land, no matter how much manure you put on it. They will gradually give place to wild grasses, that grow in the water. The meadows will grow up to rushes.

Secretary FLINT. In cases where drains have been laid, is it not almost a matter of necessity that the land should be subsoiled and cultivated very deep? That is to say, would there

be any advantage in draining, with ordinary cultivation between the drains.

Col. WARING. I think there would, sir. I think all of us who advocated subsoil ploughing so strenuously ten or fifteen years ago, must feel a little humiliated, in view of the fact that there are no subsoil ploughs used now. I don't believe subsoiling amounts to much. I believe you will deepen your loam more by draining than by subsoiling; and although there are undoubted benefits to be derived from subsoiling, I don't believe they are sufficient to pay for the expenditure of time and labor involved. You want to plant; you don't want to spend time in subsoiling.

Secretary FLINT. Is it not a mistake to get tiles that are too hard burned? Are not tiles that are soft-burned much better?

Col. WARING. Tiles that are soft-burned are liable to imperfections that hard-burned tiles are not, and I think it is questionable whether even glazed tiles, made perfectly impervious, are not good as others, because the joints afford ample opportunity for the water to get in. I forget the exact figures, but I think it has been shown in England that with drains laid forty feet apart, the fall of an inch of rain in an hour would be completely removed by the admission of two-thirds of a table-spoonful per minute at each of those joints, and that is a small quantity of water to leak through such a joint as you will have. The tiles I have used for the last three or four years have been entirely impervious; as much so as if glazed. I think they have answered a perfectly good purpose. They are much stronger and much more uniform in shape than soft-burned tiles. Soft tiles are apt to be bent and dented here and there, and so lessen the flow of water; but the tiles that I use, made by Boynton, of Woodbridge, N. J., are perfectly straight, pressed tiles.

Dr. LORING. The question that has been asked here, as to the difference between stone and tile drains is an interesting one, and it seems to me that it can be answered somewhat by observation, and somewhat through the experience of others. I have tile drains and stone drains on my farm. The tile drains were laid in 1857, and the stone drains were laid in 1861. There is not a stone drain open to-day; there is not a tile drain which is stopped up.

There is in Essex County a very famous farm, well known to those of us who reside in that section. It belongs to Major Poore, the Washington correspondent of the "Boston Journal," known as "Perley." He inherited the farm from his father, who spent a vast amount of money in drainage. There were no tiles then. This land was drained as early as 1815 or 1820, I should say. The field to which particular attention was paid was a large meadow of something like forty acres, through which a small rivulet trickled. Mr. Poore desired to convert it into a large grass field, and employed a Scotch drainer and ditcher to put it into condition. It was thoroughly laid with stone drains, as accurately and carefully as that experienced Scotchman could lay them. You can stand upon an adjoining hill and overlook that field, and you can see to-day the lines of those drains by the water grasses that are growing over them. I don't suppose there has been a passage for water through those ditches for more than twenty-five years. I don't believe there is in Essex County to-day, on any piece of land *that is fit to be drained* (and I am saying now really what I mean), a stone drain that is performing its service properly and well. The reasons why, every man must judge for himself.

Now, we have certain land to be drained. Perhaps Col. Waring would lay down stronger rules with regard to the draining of land than I should. I don't think so much land needs draining in this country as we suppose. I conceive, in the first place, that a bog meadow had better be let alone. Muck lands I would avoid entirely, so far as drainage is concerned. I don't think they come within the range of farming business, especially if you have three acres of muck land and two acres of high land adjoining. I would devote myself to the upland and let the muck land go. I don't think that lands that are drained by natural slopes, unless for some reason the springs are high in them, require drainage, and for that reason, I find a great many of the farms of our ancestors produced enormous crops of grass, grain and vegetables without any drainage at all. There is a great deal of natural drainage in this country. I know that the lands which Col. Waring has, and some land which I have, need drainage. They are precisely analogous to the clay lands of Scotland and England, which are so well drained there by tiles. Those are lands fit to drain. The land

which I drained in 1857, to which I have referred, is a very fair specimen of the kind of land which is usually drained in Scotland, and so, I have no doubt, is the land which Col. Waring brags so much about in Newport, of which there is not so much in this vicinity. Draining clay land with tiles is a good investment. The best lands can only be drained with tiles, because they usually lie so nearly level that the inclination of a stone drain would be insufficient to keep the drain open, even if there were no other reason for filling it up. So that I would lay it down as a rule, that the best lands to be drained are soft clay lands, and the best way to drain them is to drain them with tiles. I have no doubt that is a good rule. And when I say here, what I have often said before, that on five and a half acres, drained with tiles fourteen years ago, I raised in one season, on $4\frac{1}{4}$ acres $18\frac{1}{2}$ tons of hay, and on the remaining acre and a quarter eighteen hundred bushels of mangold wurtzels, you will see what a well-drained piece of land will produce, when filled with manure. But there are warm, loamy lands, naturally drained, within five miles of my farm, upon which I could have raised exactly such crops, without either stone or tile drains.

So that it seems to me that it is clay land only into which you can insert tiles with profit, and that is almost the only land that can be drained with especial advantage in this country. With regard to strong lands, they are clay lands, generally, and they are usually filled with stones, larger or smaller, and in that case, it would be advisable to displace the stones in the best way possible, and take it for granted that when they are gone, the water will go out also, and then they will be naturally drained, too.

I was very glad to hear the remarks of Col. Waring. I have no doubt that there is a great deal of land, near the best vegetable markets, that can be drained with tiles to a profit.

Col. Waring. The remarks of Dr. Loring lead me to say one word more, and that is, that I do not believe it will pay any farmer to drain a single acre, if he does not need that acre; if he has another acre that he can make pay better than it now does by spending the money on that.

Dr. Loring. That is a good rule, which ought to be printed in large capitals at the head of every agricultural paper in the country.

Mr. Buffinton. That is my rule. In 1857, my father had an acre covered with stone. He wanted to clear that up, and he went to work and dug ditches eight or ten feet deep, and filled them up with those stones. There is no real outlet for the water from these ditches; but I have never seen a year when he could not get from two to two and a half tons of hay to the acre from that field, or large crops of anything else he wanted to raise. I want to know what the reason is. The water is there under that land, and at the lower end of the field, water will stand in a wet time. That is why I think the air has something to do with it. It seems to me there must be a circulation of air among those large stones. The spaces must be filled with something.

We hear a great deal said, and read a good deal in the papers, in regard to the time of cutting grass, and we are told to cut it early. I want to know when that time is; in what state the grass must be.

Mr. Johnson. I do not understand the gentleman as putting that question to me, particularly. If he does, I will merely say, that my opinion in regard to the proper time for cutting grass is in Mr. Flint's last Report.

Prof. Chadbourne. The only thing that I saw to object to in what Mr. Johnson said in regard to the time of cutting grass was, that he mentioned a certain time—about the twelfth of July. Now, according to my observation, there is a great difference in years in regard to grass, and I think if we are to adopt any rule, it should have reference to the condition of the grass, and not to a particular day of the month. I was glad to hear him make the remark that we ought not to mix early and late grass seed in sowing our mowing fields, because some grasses come so early to maturity, that if we allow the field to remain until the late grasses are ready to be cut, the early grasses will be unfit to cut; they will have gone to seed, and will be little better than shavings. So I think we should speak to that point—the condition of the grasses in regard to flowering and seeding. My opinion and belief is, that the best time to cut grass is just as it is blossoming; you might say, when it is well in blossom. The first thing a plant does is to elaborate the material for producing its seed. With some plants, a year is spent in that work. We have an instance of

that in the beet. The first year, all a beet does is to make the great reservoir, which we call the beet root, for supplying material for the seed the next year. But in the case of the grasses, the first thing for the grass to do is to elaborate the sugar, the starch, and the various materials for the perfection of the seed, and if we allow the grass to go to seed, all this material goes into the seed; and if we allow it to stand too long, the seed drops, and all or a great portion of the value of the grass is gone. Just as the blossom comes out, just as the seed begins to form, it seems to me is the time when the nutritive material which the plant furnishes is mainly in the plant, and is best distributed in the plant. That is my own opinion. I should like to hear the opinion of other gentlemen on that point.

Mr. BUFFINTON. Ten or fifteen years ago, before I commenced farming, I went over to see Col. Thompson, of New Bedford, who is my great authority as to the time for cutting hay. I went into his fields, and I said, "Colonel, how is it that you are able to mow your hay in the morning and get it into the barn in the afternoon, and have it just as nice and sweet as any hay?" He said, "I will tell you how. When I have a field that looks almost ripe, and that is green, I mow that." I said, "That is not what I want. I want to know how I shall be able to tell when to mow this piece and that." "That is easy enough to know," said he; and he went into the field and pulled up a spear of grass, squeezed it between his thumb and finger, and some greenish water came out. Then he pulled up another spear, squeezed it, and there came out a white, milky substance, and he said, "When your grass is in that condition, it is time to cut it." I want to know whether that theory is right. I have followed that rule.

Mr. JOHNSON. When I said that herdsgrass, redtop and clover, should be cut by the twelfth of July, I did not intend to be understood as fixing that as the precise date; but I do mean to be understood, that, in my opinion, no herdsgrass or redtop grown in the eastern part of Massachusetts, or say as far west of Framingham as twenty miles above Worcester, and as far east as Newton, should ever stand later than the eighth of July. I put it at the twelfth, because some seasons, as the professor has said, grass ripens a little earlier and sometimes a little

later. I have for sixteen years got my hay into the barn the day it was cut, and before that, I tried the experiment for several years with a few loads at a time, and tried experiments with salting, with the tightness of the barn, and the packing. I think I have learned it for myself, from my own soil, from my own stock, and from my own operations. Now, if any man can show me a better lot of cows than I took to the New England show, that had been fed on my early cut and little dried hay, and show me that they had no more grain than mine have had, I will give in. If he will bring forward a pair of horses, weighing two thousand seven hundred pounds, that will go from my place to Waltham, and will not vary five minutes from two hours and twenty minutes in making the sixteen miles, and show no indication of the heaves, I may begin to doubt if my hay is so good as I think it is. If it brings the heaves on, I shall begin to think it is poor. I have three horses, and they are as fat as does, although they work. I have a pair of heavy horses, that weigh over two thousand seven hundred pounds, and of course they are not so fleet as some of the small horses; but one of them, in particular, will trot ten miles in an hour, and has done it a great many times, and has never got the heaves. If he had had poor, musty hay, he would have been very likely to have been troubled with the heaves. A good many horses in my neighborhood have the heaves. I don't know how they got them, but I suppose it was because they were fed with poor hay.

Three years ago this last July, a physician was at my place. He was not there by reason of any sickness, but of course he must have been a very sensible man, or he could never have been the successful physician he was; and he said that it was reported to him that I cut my hay and carted it right into the barn, without waiting for it to dry. I told him it was not so. He said he had been told that I cut it when it was half grown. I told him I cut it at the most profitable time. I took him to a field and examined it in the way this young man (Mr. Buffinton) has described, by squeezing the sap out of the grass. Then I cut a little of this grass and let it lie a very short time. "Now," said I, "see if you can find any sap in that grass." He tried it, and could not find any. Here we have the science. I am not a scientific man; I lay no claim to any science what-

ever; all I have got appertaining to science I have learned from experience; and that experience I have got from sheer necessity and nothing else. But I believe in science; I believe in God; and I believe that everything which emanates from him is Science, and that it is true. Science never lies. Anything that we see in science that is apparently erroneous is owing to our own erring minds; it is not science that errs. We cannot rely upon what is stated as being always scientific.

This grass to which I have referred was cut, a part of it, on the fifth of July; some of it stood until the fourteenth, from necessity, for want of help; and also, because, being a little timid in all these things, and neighbors and friends saying I should lose if I cut that grass, I thought I would test the matter; and I found that the grass that was cut on the fifth was much the best hay, and was worth the most money, I have no doubt; and that good doctor came to the conclusion, after looking at my hay, and seeing the grass and testing it, that the hay which was put in later would have been worth more than the cost of cutting, in addition, if it had been cut as early as the rest.

The reason I put it as late as the twelfth is, because I thought it might please some of the gentlemen here better than to put it earlier. I believe in cutting even earlier than that. I believe, as the professor says, that the time to cut grass is when it has elaborated all the different juices necessary to form the seed; not to wait until they have gone into the seed, because the moment the seed begins to form, that moment the lower part of the grass and the leaves begin to lose their value; begin to turn woody. My idea about cutting herdsgrass is that it should be cut the moment that the blossom makes its appearance. Clover I would cut as early as the second set of heads form. There are three sets of heads in red clover, and I would cut it at that time. If clover is cut in that way, there is no trouble in having it come out bright and nice. I sold a scaffold of hay this spring to the hotel keeper there, which was put in last year in pretty good season and not much dried. It weighed well, a great deal more than he expected it would, and he said it was splendid hay. At any rate, there was no must in that hay; his horses do well on it, and like it. I think the

surest test of the quality of hay in a man's barn is to look at his cattle, and see the condition they are in.

Now, I believe not only in giving animals good hay, but good care, grooming them, keeping them well bedded, and feeding them properly. I grain my cows every day in the year,—not much, but a little. They are fleshy and in good condition, and give me a good yield. I believe, too, in draining a good deal of land, if a man can possibly afford it. It would be profitable, sometimes, to do what a man cannot really afford, if he only had the means; but most of us farmers are short of the means to do with. Sometimes we could do better if we had more means.

I will merely add, that I hold to cutting grass while the dew is off, and ploughing the ground when the dew is on.

Mr. PHINNEY. This subject was before the State Board for discussion, and I remember that we gathered a great deal of information from Mr. Johnson at that time. But it seemed to me then, that as the climate of Massachusetts and New England is variable, we could not easily fix any time, within some two weeks, as the best time for cutting grass. It seems to be generally admitted, that the season in the eastern portion of the State is, some years, two weeks earlier than in the interior, so that it would seem that the individual farmer was the best judge as to the time for cutting his grass. I formed the opinion, from the discussion which took place at that time, that we could come to no conclusion as to whether the first day of July or the fifteenth of July was the best time for the cutting of grasses. I think Mr. Johnson, at that time, came somewhat to the same conclusion.

Dr. LORING. I think Prof. Chadbourne has made a statement which should be considered with a good deal of care. It seems to me that an acre of grass in the hands of a farmer should be made the most of. What he wants is to get as much nutriment from that acre as possible. I have no doubt that herdsgrass can be cut before the head is on it, cured and prepared properly, and made into very nutritious hay. But it does seem to me, that every farmer will see in a moment that that is not an economical or profitable process for him to go into. Now, every kind of grass has just so much nutriment in it. You want to get rid of the refuse, the woody fibre, and

save the sugar, starch and soluble salts, that go to make up the nutritive properties of the plants. You must do that either by allowing your grass to stand until it comes to that point where there is the most of that nutritive property in it, or you must cut it before that time comes, and let that nutritive property be generated in the grass as it is dried and put into the mow. For instance, immature grass is very deficient in the nutritive elements that I have spoken of; every chemist knows it,—and the tests which have been applied to immature plants show that they are deficient in them. Now, you can generate or create these nutritive elements by cutting and drying your grass, but of course you get much less to the acre or half acre by producing them in that way than you do by letting the plant stand until it has arrived at that point where the woody fibre is the least, and the nutritive elements of the plant are in the largest proportion.

Now, I am sure that the time when the plant has reached that point of economy to the farmer, and of the largest nutrition to the animal which consumes it, is just exactly the point of time which Prof. Chadbourne has specified; that is, the time of leaving the blossom and going into the process of creating seed, and before the process of making seed has taken up all those nutritive elements of which I have spoken, and which presented themselves in the end of the stalk of grass out of which the milk was squeezed by the thumb-nail of the experimenter. That seems to me to be a good law.

Experience shows that we cannot lay down any definite time for the cutting of grasses. We have in Essex County, in the marshes, what we call black grass, and a very useful kind of grass it is. Black grass allowed to stand until the middle of July is comparatively worthless; cut when it is just in the condition I have described, which is generally about the twenty-fourth of June, it is about as useful grass as we have. Now, in our section, the period of time when it arrives at the point which I have laid down varies very much from year to year. This last summer, it was late; the summer before last it was early. A field which some years you could cut to a profit on the fourth of July, you could not cut to a profit another year until the twelfth of July. And so it is with other grasses—clover and herdsgrass.

Now, I think that is a law which every farmer can follow with a great deal of benefit to himself. He need not go into any chemical analysis; that he cannot do; it is impossible; but he can tell when it is just going out of blossom, and if he cuts it then, he will hit the exact point of time when he will get the most nutriment for his animals out of any given piece of grass, standing upon any given piece of land. That is the rule for all grasses. You cut, for instance, a large crop of rowen, which is entirely immature. You dry it, put it into your mow, and the process of drying and packing creates in it just what nature would have created if it had been allowed to grow long enough, and the season had been long enough. But every farmer knows that it is the most unprofitable thing he can put into his animal. An animal fed on rowen will make an abundance of everything else but milk or meat. It does seem to me that a good short-horn cow could eat about half a ton in two days. You know perfectly well that she can keep at it all the time. There is no let up to it. The reason is, that the actual amount of nutrition in that grass is small, and the non-nutritious substances are so arranged that they pass right through her, and keep her mill going all the time. That is of no earthly advantage to the farmer, and it seems to me that is a thing we must avoid, and avoid entirely.

With regard to curing grass, I will not undertake to controvert what Mr. Johnson has said, because I don't know anything about it. I am afraid to cut my grass in the morning, after the dew is gone, and put it in in the afternoon. I had one curious experience, which I will relate. Black grass requires a great deal of drying. One year, I had over forty acres, and I cut it as fast as I could. It was when I was young and enthusiastic, and pitched in myself, and did a good deal of work in a day,—for me. Well, the grass was down, the weather was fine, and I thought it was dry, but the knowing ones said it wasn't. However, I said, "This hay looks well, it is in as good order as it can be, and I am going to fill my barn with this black grass,"—and I did. In about four days, I put my hand into that mow, and I had to take it out again pretty quick. I took it for granted that that black grass and the barn too would go if I did not work smart; so I had all that hay pitched on the floor, turned over, and put back again. I am

sure of this, that I had no hay of that description of which my animals consumed so much, or which seemed to do them so much good.

QUESTION. What in your opinion would that have been, if it had not been pitched over?

Dr. LORING. I don't know what it would have been, but I know I would not be so frightened again for any living thing. Mr. Johnson says that his hay is good. I have no doubt of it; but old-fashioned hay, made in the sun, is good, spends well, and goes a great ways. I do not say his does not. Perhaps both rules are right; one rule I know is; that I am satisfied of.

Now, in regard to the grasses. I have tried all of them. There are all sorts of grasses, but herdsgrass and redtop are *the* grasses; all the rest are only substitutes, in the long run, for these. You may hunt the whole catalogue over, and you will find nothing to equal them. Clover, Hungarian grass, etc., may answer as substitutes, but the best hay, the richest in nutritive qualities, that can possibly be raised on an acre of ground in New England, is hay that is made from herdsgrass or redtop, or the two combined, which is better yet. You may put your working oxen, your dairy cows, your working horses, or anything else, on to any other kind of grass, but there is nothing, in my opinion, that will come up to those two, cut and cured according to the rule suggested by Prof. Chadbourne, by which mode all the nutritive qualities of the grass, the sugar, starch and soluble salts, will be preserved, to meet the wants of the animal.

Mr. JOHNSON. I think the doctor, Prof. Chadbourne and myself agree entirely. I am very happy to find that we do agree, for I never disagreed from the doctor in my life, and I hope I never shall. I certainly shall not, if he always behaves as well as he has to-day. We all agree that the time to cut hay is at the time when it is at the highest point of nutrition. Now, I do not understand that Prof. Chadbourne lays it down as a scientific principle here that that time is when the redtop or herdsgrass is fully in blossom. I agree with the doctor that these two grasses are the most valuable ones we have. I believe that the time for cutting is just before these grasses are in full blossom.

Now, I am not scientific; I don't claim to be scientific; all I claim is, that a scaffold of my early cut and little cured hay, as I call it, will keep my cattle longer than hay that is so thoroughly dried as people used to dry it. Why, sir, where would this world be if there was no improvement? Where should we be, by-and-by? There must be improvement in cutting and curing hay as well as in growing it. I must think that some people here in our good old Commonwealth are a little behind, if they don't begin to see the improvements that are going on in the curing of hay, and particularly in the time of cutting it. Why, sir, I suppose that there are hundreds of tons of hay in Framingham that are put into the barn the same day that it is cut, and they cut very heavy crops of hay there, and cut very early. There is one man who cuts more than a hundred tons of hay, and his hay was in the barn this year before the tenth of July.

Again (and I hope the doctor will take particular notice of this), last year was one of the years in which we cut our grass early; year before last we cut it early, and next year it will be fully as important that we cut it early, because it has been so early these last two years. We have got to give the second crop a chance to come up and grow, and give us something to start upon. August is the time for our grass to start for the next year. Very little has started this year, and I think, therefore, that we shall come pretty short next year. I advised my neighbors this year,—and many of them agreed with me,—to cut their grass rather early, with the idea that, even if we did not get so much grass as we should if we postponed cutting until later in the season, we should gain it by the grass getting a good start for next year. I am satisfied that many of us cut our hay altogether too late. And as for hay going through cattle and scouring them, as the doctor says, I have no trouble of that kind with my stock. I don't use much salt in my hay. I don't believe in salting cows very much; a little at a time, and often. But I do believe that the proper time to cut hay is when it has the most nutritive value, so that, when it is cut and dried, it may be the nearest like green grass. It is better for our cattle, they relish it better, and certainly they are pretty good judges.

Hon. RICHARD GOODMAN, of Lenox. When you, sir, drew such a vivid picture, this morning, of the condition of Fall River, showing to what a height of wealth and prosperity it had attained through its manufacturing industries, I felt that agriculture had sunk below an immeasurable distance. But, sir, you failed to tell us of the difference between the profits of farming and the profits of manufacturing. I felt, however, somewhat relieved, when I began to consider the subject, by this consideration: that without the assistance of the farmers and the food which they supply, your spindles would cease to run, your mills would be empty, and the prosperity of Fall River would fade, "like the baseless fabric of a vision, nor leave a rack behind." I was reminded of the story of the organist, who, whenever he spoke of his instrument, always said, "You and I." One day, while he was in the midst of his music, the organ stopped. He turned round to the boy who had been blowing and said, "Why don't you go on?" He replied "I will go on, when you say *we*."

Now, having listened to this discussion on the hay crop, I begin to feel that we can say, with some satisfaction, this hay crop is to us farmers, what manufacturing is to Fall River. And, often as we have discussed it in the Board and elsewhere, although we do not arrive at a satisfactory conclusion about it, we do get some information. One of the most interesting points of this discussion is the question of the time for cutting hay, and I think that if the chemists and scientific men would study this subject accurately, acutely and scientifically, they might arrive at the precise day when our hay should be cut; but that rule would not apply equally well to all sections of the State. Take the western part, for instance, where we have a great deal to cut. We have to begin early and cut late. It is a long while before we can get all our hay in. We cannot always cut it when it is just in blow or just going out of blow. We want some general rule on the subject. And, sir, the value of this discussion is this: that it will tend to establish some general rule which we can try to live up to. It is a remark of an acute historian, Mr. Froude, that there are some laws which must be placed upon the statute-book, not that they can be carried out, but that men may live up to them as nearly as possible. That same rule applies to the prohibitory law; it

applies to the ten commandments. We do not abolish them because we cannot live up to them, but we want to live up to them as nearly as we can.

Now, this theory of Mr. Johnson's about cutting hay and putting it in the same day, although I have never tried it myself, I think may probably be successful in practice; and so I think the rule that we must cut our grass when it is going out of blossom, and before the seeds begin to form, is a good one. It is important for us to lay down these practical rules, because we want to live up to them as closely as we can. The farmers throughout the country cannot, as a general thing, stop to analyze, and go into all these minute particulars. What they want is some general rule on which they can rely, in regard to the time of cutting their hay.

Now, in my part of the State, a good many farmers still cling to the old-fashioned notions, and they will not begin to cut their hay until all their other work is out of the way. They get mowing machines and tedders, and all the new-fashioned implements, but they think they cannot use them until the hoeing is all done; they have no idea, apparently, that it is possible to carry on two kinds of work at the same time. That policy works more harm than anything else. Those of us who are in the habit of using machines, and managing this thing properly, can carry on our hoeing with one set of machines, and our haying with another, at the same time. I noticed this year, when hay was very scarce, some of our farmers waited until after the fourth of July, until after hoeing was over, and the annual frolic over, before they cut their clover. Every one knows it is not worth one-quarter so much as it would have been, if it had been cut earlier; and not only has the farmer lost a considerable portion of a valuable crop, but he has put himself behind in getting his other crops. It will be a good thing if we can lay down a general rule as to the time when our clover crop should be cut. And just here I want to say, that so far as the cutting of clover is concerned, there is no more valuable aid to the farmer than the hay-cap, which is not much used in this country, but which in England is considered as indispensable to the farm as the hoe or mowing machine. If you have these caps, you can cut your clover at any time in fair weather, cock it up, cover it with a hay-cap, let it lie a

week, if you please, and take it in at your leisure. A man who has a farm of the ordinary size, one hundred or one hundred and fifty acres, if he begins his haying before the fourth of July, will not get in his hay, with the amount of labor at his command, any too soon. I believe we get in our hay in just as good condition as the farmers do down here. I have seen them getting in hay with snow on the ground,—probably for convenience in getting it in on sleds. We are not quite so bad as that, and I am glad to say that we are improving in many respects. Our farmers are getting in their hay a great deal earlier than formerly, they are getting it in better condition, and our cattle are feeling the benefit of it. We in our section are largely engaged in dairying—sending our milk to market, making butter, and in every way using the products of the cow. This question, therefore, is one of great importance to us, because it is the hope of profit that actuates the farmer, and when he finds that he can get a larger production of milk by using the early-cut hay, he will be very apt to turn his mind to these new improvements. Not many years ago, my friend, Col. Waring, sent to me, and wanted me to make some experiments in relation to feeding early-cut hay to my cows. I was feeding a large number of thoroughbreds. At the same time, he sent to another man on the Hudson River, who was feeding late-cut hay. On comparing the results, he found that, with the same number of stock, I was getting a larger production, using only one-fourth as much grain, and my cattle were in better condition. My hay was cut the middle of July. My friend on the North River did not finish haying until the middle of August.

Dr. Loring. I think my friend has laid down a rule that is a little hard upon the clover business. It is the fourth of July all over the country, but the latitude is different, and the growth of plants different in different sections. Clover matures faster in Southern Connecticut than it does in New Hampshire; than it does with us.

There is another thing. If you seed down a piece of land just before the frosts come (although as Mr. Johnson has properly said, August is the best time to sow herdsgrass and red-top), especially if it is heavy land,—I doubt, by the way, a little, the propriety of seeding such land in the fall,—it would

be well to sow upon that land, early in March, upon the snow, clover seed. Now that clover, sown in March, will not blossom until after the fourth of July; it will not start and grow and get into blossom by the fourth of July. Why not apply just the same rule to clover that you do to herdsgrass? There is a time when that plant is just in the condition that I have described the herdsgrass to be in when it arrives at the point to which Prof. Chadbourne has alluded. Why not take the clover at the same time, and cut that just when it is in rich blossom? I think that is the proper time to cut it; and I think, from the statement of Mr. Goodman himself, when you consider that the time when clover matures in different sections of the country is different, that that is all he meant by what he said. I think the rule I have laid down in regard to other grasses will apply to clover,—that the time to cut it is when it is in blossom, and not on any specified day. If we are going to have any particular day, don't let us have Christmas or fourth of July; let us have Thanksgiving, for the governor can appoint Thanksgiving whenever he pleases.

Mr. Goodman. The doctor takes exception to the general rule. The general rule is, that all clover is ready to be cut by the fourth of July. Of course, clover that is sown in the spring is an exception to that rule. I think it is a great deal better to cut clover before it begins to turn brown at all. What I am most particular about is, that we get our haying started before this great national holiday, because the effects of it very frequently last four or five days, and before our workmen recover from them, it is too late in the season to cut our hay to the best advantage.

Mr. Allis, of Conway. I think the recommendation to seed down land in the fall is a good one; but I would like to inquire whether dry weather would not have a peculiar effect upon it, so that it would not prove in the end any better or so good as if sowed in the spring. A year ago last August, my neighbors, on the lands on which they raised tobacco, sowed wheat, and seeded down in the month of August. I left three acres, on which I raised tobacco that same year, until spring, when I ploughed that land, harrowed it over once, then sowed my oats, harrowed them in, sowed herdsgrass seed,—nothing but herdsgrass,—and rolled it in. Last haying time, those neigh-

bors who sowed their seed in August, had a small crop of sorrel, and that is all they had, on highly cultivated land for grass. I mowed two heavy crops on my three acres which I sowed in the spring. I attributed their failure to the fact that the ground was so dry, and the drouth held on so late that their seed did not germinate.

Mr. KNOWLTON, of Upton. I have had considerable experience in fall seeding. I very much prefer seeding in August, but when the land is so dry that I cannot seed in August, I defer seeding until the last of November, so late that the seed will not germinate that fall. I have tried it three years, and I have had splendid crops in every instance. I tried rye in the same way, and had good crops of rye. I would not recommend this practice when the ground is in good condition to seed in August, for I believe that is the best time to seed, when the season is favorable. But my experience has been very unprofitable in sowing grass-seed on dry ground, or in hot weather; the drouth has killed my seed. I have some land now that I have got to turn over on that account. The grass crop is my crop; I am going to abandon the hoed crops; and m success has been good in seeding even as late as the last of November. I have not had a failure, either in rye or in grass. The weeds trouble me more in the spring with the late seeding than if I sowed in August. I put on my harrow, sow my seed, put on my bush harrow and the roller, and my grass gets up so that it overpowers the weeds, and I have no trouble in the spring, but when I sow late, I do have some trouble with the weeds.

Mr. BOISE, of Blandford. Mr. Knowlton says he has given up the hoed crops. We in the western part of the State cannot compete in raising corn. Grass is our crop. Then the question comes, How shall we revive our lands where the grass roots have been killed, without ploughing? My own practice has been,—and I have been very successful,—to top-dress, put on the harrow in the fall, and tear up the turf. Then I went on and sowed herdsgrass late in the fall, and in the spring, in the late snows, I sowed clover. My neighbors thought I was spoiling my land, and that I should not get any grass; but I have, in four years, more than trebled the capacity of my farm for the keeping of stock. It was all run down when I took it.

There is another point in regard to getting hay in. I never want but one day to make my hay, and I cut three tons to the acre. I cut one day, and get it in the next. But there are exceptions. If we have had a rain, there is more moisture in the ground, so that the hay will not dry so quickly, and the juices of the grass will not be absorbed so readily. I think that point should be taken into consideration.

Mr. ALLIS, of Conway. In our Connecticut River Valley, you know that our special crop is tobacco; but our farmers have got into the habit of sowing wheat somewhat, and they are raising very good crops—thirty or forty bushels to the acre. They seldom, if ever, plough their ground, after the crop of tobacco is taken off. They merely take a cultivator and run it over the ground until they get it about level, and then sow their wheat and roll it down. Those who have tried this plan, think that their seed is more likely to catch, and their wheat also less likely to winter-kill than if they ploughed.

Mr. BUFFINTON. How would the crop compare in quantity?

Mr. ALLIS. I can only say for myself, that I have had better success, after tobacco, in having my grass come up strong and heavy, than I ever did before. I have been told again and again, that I was ruining my farm by raising tobacco, but I have followed it twelve years. I have turned over about half the land that I used to mow to pasturage, and I get a great deal more hay than I did before, and of a better quality. I never put tobacco on any piece of land more than two years in succession. Then I seed it down, and follow it up.

Mr. BUFFINTON. How is the manure heap?

Mr. ALLIS. If it is not as big, I endeavor to make it as big. I aim to have it as large as possible.

Adjourned.

EVENING SESSION.

The evening meeting commenced at 7½ o'clock. There was a large audience in attendance, among whom were many ladies.

The CHAIRMAN. I have the honor of introducing to you this evening, the Hon. WM. B. WASHBURN, the governor elect, who will preside on this occasion.

REMARKS OF HON. WM. B. WASHBURN.

Mr. President and Gentlemen of the Board:—It has given me great pleasure to be with you to-day. With some of you, I have been acquainted for years; others are comparatively strangers. I need not add that I have been not a little interested in the exercises thus far, and especially with what I heard in reference to this county. I had heard of it before, and thought I knew something of it; and when your good chairman presented the facts and statistics, I listened to him with deep interest; but when he informed me afterwards that he had given us only about one-half of the facts, I really felt that I should go back with the conviction that I had known but little of this good county, and feeling a deeper interest in it than I ever had before.

But it is not my intention to take any of your time. I know that you are all waiting to listen to him who is always ready, and who this evening has to present a subject of deep interest to you all. I therefore take pleasure in introducing to you Prof. CHADBOURNE, who will now favor you with his address.

UTAH AND THE MORMONS.

BY HON. PAUL A. CHADBOURNE.

Mr. President and Members of the Board:—We have in the midst of our country a peculiar people. They have religious views which we should not accept, and they certainly have some practices which I presume we should not be inclined to adopt. But it is an old adage,—so old that it is written in one of the dead languages,—that it is lawful for us to learn even from an enemy. It is certainly lawful, right and desirable that we should learn from every great experiment that can be tried in our country; and it does seem to me that this American continent, the first one to come up out of the waters of the ocean, and the last that received civilized man, is the great theatre on which the grand experiments of the world are to be tried. We have had many tried here; many in government, many in religion, and others still remain to be tried; and the Mormon people, despised by many, and, as I believe, a much-abused people, are trying an experiment to-day, and have

been trying it for twenty-five years. The results of that quarter of a century of labor are worthy of the study of every man in this country.

In order to understand the exact conditions of that experiment, it is necessary to say a little of the people and something of the country as they found it; and then to speak of the results of their industry. I speak of their work as an experiment, a wonderful one, and one from which we can learn much, because it has been tried so far from all other communities that its results can be exactly ascertained. The work that has been going on in Salt Lake Valley, and throughout the valleys of Utah, has not been affected, and cannot be affected, by any work done in the Eastern States, nor by any done in California. It stands by itself. Therefore, all those peculiar changes of which I shall speak to-night, you will understand are the result of the work of the Mormons within that fine belt of mountains, the grand Wahsatch, that surrounds the valley.

We are to remember, also, that the people are not, as a whole, the best kind to try an experiment. The Mormon religion is of such a nature, that it would be impossible for a Mormon to come into Fall River, or into Boston or New York, and collect a great number of followers. It is so peculiar, that it requires a particular class of minds to receive it, and therefore they find only here and there one, all over the world, who will receive it. But their system is such that when they do find one, in England, in Scotland, in Wales, in Denmark, in Norway, in Sweden, or in any other portion of the world, who receives that religion, they bring him over, if he desires to come, to Utah,—to Salt Lake City,—to the "Zion" of the "Latter-day Saints." Therefore the Mormons are a people who have been gathered out of many nations, and are in every sense of the word a peculiar people. And especially so in this,—I do not speak of it as a matter of disparagement at all,—that the mass of them have been gathered from the lower ranks of society. There you have a hundred thousand people brought together from different portions of the world; brought together from the lower ranks; many of them poor, ignorant, coming there in great poverty, and commencing that experiment under, you might say, the most adverse circumstances. We are to remember all this in considering the results of that experiment.

Now let us look for a moment at the land which they inhabit, and see how they found it. Just think of our land. If we get into the cars in Boston, and go on day and night, day and night, and yet day and night, we begin to have some appreciation of the extent of this wonderful land of ours. But after we have crossed the Missouri River, having gone fifteen hundred miles—for you are not fairly started towards Salt Lake until you reach Omaha, and have found the Union Pacific Railroad—we start from there, and, gradually rising, find at once that we are in a different region. The herbage becomes short. It is a treeless region, except where the water-courses are. We go still further, and the grass disappears. As we go on, mounting higher and higher, we find ourselves passing at Sherman, nearly two thousand feet higher than the top of Mount Washington. Take "Greylock," the highest point in Massachusetts, and take up another "Greylock" right from the ocean and pile it upon the top of "Greylock," and then far above that the cars will be moving, as we find them at Sherman. So that the valleys among the Rocky Mountains are vastly higher than the highest land we have in Massachusetts. The lowest point in the valley of Salt Lake is over four thousand feet above the level of the ocean, so that if we could sweep everything away from it, Salt Lake Valley would stand as a lofty mountain as compared with the general level. But as we pass on, we come to lofty mountains—the vast range of the Wahsatch. Deep rifts cut through them, called "cañons," through which we pass, and as we look up on either side, we see immense limestone walls grooved by the old glaciers that have left their marks upon the solid layers of quartz. And then we see the streams rolling onward as they have rolled so many thousands of years, and carrying down, east and west, into the central portions of the continent, the water from the snows that have fallen on those mountains.

We have here what is called the Great American Desert; and the question arises in our minds, constantly pressing itself upon us as we go on, hundreds and hundreds of miles across this desert, Is it possible that this land can become anything more to the American people than just so much solid earth to hold the world together? Is it worth anything? Acres and acres, miles and miles of sage-brush, so called, that is, a kind of wormwood, that will only grow where water seldom if ever

falls, and where little else can flourish. What is the cause of this desert? We find at once that it is over-drainage. There is probably some land that needs to be drained; but the great mass of it has been over-drained. Salt Lake Valley is a good example of this sort of land. You see on the way through this desert the marks of an immense number of old lakes, probably most of them of fresh water, although the great lake of Utah Valley is now salt, as I shall explain. From the central position of our country, we find rivers rolling to the east and west and carrying off the surplus water; and those rivers, rolling on for thousands of years, have worn deep channels through the rocks, in some instances a thousand feet. Lieut. Powell told me that, going down the Colorado, he could count almost the whole of the geological series where that river had made its way down through the solid strata. These rivers, running east and west for thousands of years, cutting their channels deeper and deeper, have cut through the edges of many of those lakes and have drained them. And they are the vast drains, taking out from the centre of our continent the waters too rapidly, and carrying them to the Atlantic Ocean on the one side, and the Pacific Ocean on the other. And therefore we have this vast region, the American Desert, so called, which is over-drained; so that trees and plants that require water can only grow around the mountains, and in certain places in the valleys where the waters from the mountains accumulate. The great mass of the land is a barren waste, covered with the sage-brush that marks the desert.

In Salt Lake Valley, and all around that region, we have a country which is not drained at all into the ocean. How does it happen, then, that this becomes such a barren waste? It happens just in this way:—that the water, being drained off towards the Atlantic on the one side and towards the Pacific on the other, we have here a basin that can receive water only as it comes from the mountains on either side; and those mountains upon either side condense the water from the clouds before it comes over that great valley; it is deposited in the form of snow upon their summits, and as it melts and rolls down into the valley, we should expect, of course, that the valley would in time become filled with water. That is not the result, however; because the wind that comes from the south in the sum-

mer, sweeping over the barren sand that in the daytime is heated up almost to the burning point, becomes so hot and thirsty that, when it sweeps over this valley, it just takes a shaving of water from that lake and carries it over the mountains, to be deposited on the other side or carried further north. That process is carried on all summer, and it is so rapid that water enough never falls there to cause the lake to rise so that it can roll over the high ridges of the mountains and be emptied into the ocean.

When the Mormons came into Salt Lake Valley, the evaporation from the valley was just equal to the water that gathered in it from all sources, so as to leave as a residuum the old original Salt Lake, which was nearly one hundred miles long by forty wide. And it was salt as salt water could be; for the reason that the streams that come down into that valley formerly flowed over salt beds—some of them perfectly solid masses of salt, so that it can be quarried as you do granite. You may take out immense blocks of salt, in some places, and look through them as you do through window glass, so clear and beautiful are they. Salt Lake having no outlet, the water and salt which are carried down there remain in the lake, except as the water evaporates; and although to-day Salt Lake undoubtedly contains nearly twice as much water as it did when the Mormons went there, it is still so very salt, that in the spring of the year when the water flows into the shallow places on either side, and afterwards dries up, you can shovel up just as much as you please of the most beautiful salt.

Now I have touched upon a point upon which I must enlarge right here. I say that Salt Lake contains nearly or quite twice as much water as it did when the Mormons came through Emigration Cañon, and, coming in sight of the lake, burst out into the song—"Now Zion's banner is unfurled," thinking they were led there by God, and determined to fix their homes there. This valley presents a problem in physical geography; and I want to make a statement respecting it, because the experience of the Mormons will perhaps serve to correct some of our opinions in regard to physical geography, and will suggest some problems for us to study upon. I do not pretend to explain all the changes that have taken place in this valley; but I will give the facts. That great lake, one hundred miles

in length by forty in width, has risen regularly one foot at least a year, for the past ten years. The water in that lake is now ten feet deeper than it was ten years ago. Now, if you take ten feet from the surface of that lake,—as it extends over so much of the country, it has eaten up immense quantities of land every year,—I say, if you take ten feet from the surface of that lake to-day, I have no doubt you will have nearly as much water as in all the lake underneath, because it is a comparatively shallow lake; and the portion underneath occupies so much less area, that I think I am perfectly safe in saying that the water is twice as much as it was twenty-four years ago when the Mormons came there. If we look up on the side of the mountains, we see the old beaches where the lake once wore its way into that solid rock, showing that where Salt Lake City now is, was once deep down in the water. The lake is now slowly rising, and if the process that has been going on in the last ten years should continue, the time will come when the Salt Lake problem will be solved; it will be in a state of perfect solution; for the water will rise and wash far above it on the mountain side. But it is not in Salt Lake Valley alone, or immediately around the lake, but in all the valleys around there and throughout that territory, that the water is increasing in quantity. Capt. Stover, who went from the State of Maine, told me that ten years ago he cut grass on the borders of Stockton Lake, where now the water is forty feet deep. He said that then there were no fishes except small ones in the little streams there, and now there is a large lake, forty feet deep in the deepest part, and well stocked with large and beautiful fishes. When you pass up and down throughout the Territory, as I have done this summer, you will find evidence that in all the streams the amount of water is constantly increasing, and the Mormons regard it as a direct interposition of God. They think it a special providence in their behalf, and I do not wonder at it, when I see what it has done for their valley. Brigham Young's son once told me—not on a religious matter, but I could see that he believed in it as a religious matter—that he had just come from a certain settlement in the southern part of the Territory, where this increase of water was very manifest. He said that the water was constantly increasing, and new springs were bursting out. "Now," he says, "twelve

years ago they went down there and planted a little settlement; and they estimated the amount of water there was there, and our people have become very accurate and exact in estimating the amount of water required for the use of every family, and also for the raising of the products of the earth. We calculated there was water enough in that place for twelve families, and we located them there. I have just returned from there, and there is a population of fifteen hundred souls, and an abundance of water for all." I could see at once the effect upon his mind.

Now, this increase of water is a part of the problem that we have to consider. Let us see exactly what has taken place. I saw it stated in a paper within a very short time, that Prof. Henry has made the statement that the observations compared at Washington for the last twenty years have shown that the cutting off of the forests does not affect the *rain-fall*, as has been popularly supposed. Now let us see if we do not get something here that bears upon that point. Perhaps he is right about it, and perhaps we have not looked in the right direction. I am much disposed to think we have not.

What have the Mormons been doing to increase the amount of water? Let us look at that question first, and then we have some other aspects of the case to consider. Certainly one thing they have been doing is to cut off the wood through these cañons. Not only have they been cutting it off very rapidly themselves, but fires have gone through there and burned up immense quantities, so that the number of trees around Salt Lake Valley is very much less than it was when the Mormons went there. We certainly cannot then attribute the increase in the water to the trees in the mountains or in the cañons. The water almost entirely falls upon the mountains and runs down into the valleys. The water falls mainly in the form of snow in winter, and this snow finds the streams that flow into the valleys. In my opinion, the increase of water through all that Territory,—and I wish to say here that I am now touching upon a point that I do not feel certain about at all; the facts I am certain about, because I have seen them; I am now touching upon theories, and perhaps against those theories which have seemed to be well established,—I say it seems to me that the increase of water throughout the whole of this valley (and of course the increase

of water throughout this valley has an important bearing upon our ability to use the rest of that land through the Rocky Mountains)—that increase, I say, depends not upon the greater fall of water, by any means, but upon the prevention of evaporation. Now let us see what the condition of things was when the Mormons came there. Here was this immense valley, most of it a barren plain, so that in the summer time it was so hot that the winds came over it thirsty and ready to lick up the waters and carry them over the mountains, and the water that came from the mountains and through the cañons came down in streams which made their way with the greatest rapidity to Salt Lake. There was that lake and the streams, there being no trees or anything upon their banks to prevent evaporation, all exposed at once to the hot wind that came from the south, which, having no trees in its way, swept along very rapidly, and constantly carried this water off. Now let us see what the Mormons did. They stopped this water coming out of the mouths of the cañons. They dug canals all along the base of the mountains, and, instead of allowing it to come down into the lake, they carried it along in the canals, keeping them all the time full, and then they tapped them in a hundred places, taking the water along in rivulets, making this whole land like a sponge, and not allowing the water to go down into Salt Lake until it had permeated the soil. Well, you say that so much water is apparently lost,—that Salt Lake, having so much less water coming into it, would be so much smaller. But these canals go through land that is now covered with herbage of every kind, and rows of cotton-wood trees and other trees, which shoot up as if by magic. And that is not only the case in the comparatively small territory about Salt Lake, but all through that valley. Most people who have visited Salt Lake City for a few days, come back thinking they understand the whole Mormon question. The truth is, they see but a small sprinkling of the Mormons there. They ought to go down through the Territory one hundred or one hundred and fifty miles, and find out what they have done. We find now the valley through this entire Territory, instead of being a dry, barren plain, over which the wind used to pass so rapidly, a country covered with vegetation, with grass, with corn, with grain of various kinds, and with groves of trees, so that the wind, in the first place, moving up

through the valley, is checked by the trees, and when near the surface of the earth, it probably does not move up the valley with half the rapidity it did. And then remember that, on the surface, instead of passing over hot, barren sand, it passes over fresh herbage, so that we have all through that valley a layer of air that moves comparatively slow, and at the same time is charged with moisture, so that, when it strikes the great Salt Lake, instead of being a rapidly moving current of air, hot and thirsty, it is moving comparatively slow, is nearly saturated with water, and has no longer any ability to take up the waters of the lake as it formerly did. Therefore the waters accumulate, and so over the whole surface (and this is true of all these places) evaporation is prevented by the introduction of trees to prevent the rapid movement of the currents of air, and also by covering the whole surface of the earth with this vegetation. That is my explanation of the increase of water in that valley. It is not that any more water has fallen there,—perhaps not so much, certainly not any more,—but I believe it is because the water is saved.

But there is one thing that may seem to bear against this theory. It is asserted by the Mormons—I cannot say whether it is so or not—that the rains are more frequent in Salt Lake City than they were twenty years ago, when they first came there. That would seem to indicate that more water falls there. Let us look at that a moment. I have been over this country, back and forth, eight times, and have spent two seasons there, and I have watched this thing very carefully. The rains they speak of as falling in Salt Lake City and around there, are showers; and I have noticed this respecting them, that the clouds are generally of small extent and hang very low. Every shower that I have seen there has apparently commenced within the mountain ranges. It appears as though these showers are formed from the vapor rising from the valley, and condensed by the cold currents of air that come over the mountains. As there is a larger evaporating surface and less movement of wind near the surface than formerly, more vapor accumulates in the air than when the country was bare of vegetation. The water that falls is not directly from the Atlantic or Pacific—in that case it would be a real addition to the water in the valley—but

is just the coming back of what went up, instead of its being carried over the mountains as it formerly was.

Then there is another thing which is very interesting connected with this problem which they are solving; and that is the change of climate. I notice that, in giving a report of a lecture that I gave the other night, the papers mixed things up a little, as they sometimes do. They reported me as saying there were formerly frosts every month in the year in Salt Lake City. It may be true, but I didn't say that. What I did say was, that there are parts of the valley where formerly there were frosts every month of the year, where now they can raise corn and the most tender vegetables with the greatest ease. No trouble from frosts at all. The frost was so common in the valley, that when the Mormons came to Fort Bridger, and old Bridger asked where they were going, and they told him they were going over the mountains to live, he said, "You may as well go back, for you will find nothing to eat." They told him, "We have got the seed that we're going to plant." "Plant!" said he, "I'll give you a thousand dollars for every bushel of corn you raise there." It would take a large treasure to buy at that rate the bushels of corn that can be raised in that valley now. In San Pete County, especially, one of the first settlers who went there told me that, every month in the year, they had not only frosts, but quite severe frosts; but when I was there this summer I saw all the agricultural products that man could desire, raised in the greatest abundance. How is this to be accounted for? Why, this same condition of the country that rendered evaporation so rapid when the Mormons first came there, caused radiation to be excessive; the air was perfectly clear nearly all the time; it was free from moisture, and therefore, when the sun was down, radiation took place with very great rapidity. The surface became cold, and the frosts were severe. But now their process of bringing the waters down from the mountains, making them fill the whole land and cover it with vegetation, causes the moisture to rise up in the air; the cold air from the mountains condenses that moisture, and that protects the surface of the earth like a covering, and therefore the frosts are prevented. It is perfectly plain to me why they disappear, although many of the Mormons look upon the change as a miracle. It is a wonderful illustration of the operation of

those laws of God which control the whole universe; and when we do what we ought to do, accept that curse of labor which is a blessing as we are now, the very elements respond to our work, and meet us almost half way, if we only know how to meet them and take advantage of them. Here, then, in this valley, where Bridger said he would give a thousand dollars for every bushel of corn they would raise, we find that the water is becoming more and more abundant every year,—that the frosts are driven back,—so that many parts of that valley are like the most cultivated parts of New England; and in a very few years I believe it will be the best cultivated portion of our land. So much for the physical geography of that country, and the changes which have taken place there. The study of those changes will be of very great advantage to us, for you will see at once that the solution of this problem will enable us to judge of the value of immense quantities of land through all that mountain region. That is a matter of very great importance; not, perhaps, because we want so many more acres of land, but because of the desirability, as was stated here this afternoon, of raising the various articles of food where we want to consume them. When the lumberman goes into Aroostook County to cut down his trees, he must eat; and if you can raise his food there upon the ground, you make it better for the lumberman and better for the farmer. Now these ranges of mountains are perfectly filled with metals. It is the most wonderful country in the world. And it is of very great importance that, in connection with such immense mineral treasures as those mountains contain, we should be able to know that in every little valley where the water from the melting snow runs down and gathers in springs or in small lakes, if we will take hold and cultivate the land, we shall find the climate continually growing better, and the water increasing in quantity, so that we may have near the mines the very things which the miners want to consume.

Here is one of the things which the Mormons have done: Twenty-four years ago, last July, they first saw Salt Lake Valley—most of it a perfect desert. They came there in poverty, came there persecuted; for, whatever we may say of their religion, they came there a persecuted people, and in the greatest poverty. As some of them told me, they had to go down

in the lowlands and dig thistle roots month after month to live. They came there in that condition, and now we have that whole valley teeming with flocks and abounding with corn and the finest fruits that grow anywhere; all prepared beforehand for those mines that are now opening with such richness all through those mountains. If you take up the papers you will see very severe things said about the Mormons, because they refused to let their people go into the mines. It is said that they kept them from mining, kept them from riches, etc. But when I look at that people as they are, and remember what they were, and how they came there, it seems to me that the Mormon leaders did not only the wisest but the kindest thing they could do. Suppose they had sent those poor, ignorant people into the mines searching for minerals in the days when they hadn't enough to live upon in the valley, what a poor, miserable set of men you would have had all through that valley! The leaders said, "Your first duty is to cultivate the earth, to raise crops, and lay up a store of corn and wheat—enough for yourselves and your families." They insisted upon that, and the people followed their advice. I do not believe at all in the Mormon system, you understand, but I do believe in the wisdom of that advice. I believe that the people are richer and happier by far to-day, in consequence of having followed that advice, than they would have been if they had spread through those mountains, digging—they knew not for what; and left the valley as it was—a desert. They would have been doing the most unwise thing, and we should have had pestilence and famine instead of the plenty we see now everywhere. Now the time has come when the mountains can be dug from top to bottom, for food is abundant and cheap. The finest wheat that ever grew is raised in San Pete County, and sold for half a dollar a bushel.

Perhaps I should say something in regard to the Mormon mode of cultivation. Of course, they depend entirely upon irrigation; because, when I say that water sometimes falls, you understand that it is not enough, by any means, to insure crops. No crop can be produced, in most of that country, without irrigation. Therefore, no land can be cultivated except that which can be irrigated; and in order to be irrigated, it must have a certain relation to the streams that come out of the

mountains. But it happens, in a country which is made up of mountains and valleys, that almost all of the land is so situated,—the great portion of it is so situated,—that water can be brought upon it. There are benches or old beaches running along the mountains and sloping towards the valleys, and by digging large canals on them, and then by tapping these with small canals, you can bring the water down upon the valley for irrigation. This is a thing that could not be done except under a system of organized labor; and here we have another thing which is worthy of consideration,—I don't believe in the Mormon system which does even this, because I believe man should be independent,—but here is coöperation; and I believe in the principles of coöperation. It is to be a great thing, and we have not begun to study the subject enough. The coöperation here is under the direction of a leader—just the same sort of coöperation that there is in an army when it has a general at the head of it who commands his subordinate officers, and his officers command the privates, and every man has to go just where they say. That is mainly the sort of coöperation there is among the Mormons. You know that in such a way you get an efficient army, and in this way they have secured great efficiency in working out this problem. Labor is organized throughout the whole extent of that Salt Lake territory in such a way as it is not organized in any other part of our land. You have Brigham Young, that old, stalwart fellow, whose nod moves all Mormondom, and who is nobody's fool; with a big head and bigger neck, a jaw like a lion, and whose will few can withstand. He has an eye also for business. He is a shrewd business man; a man of sound judgment in all temporal matters. Of course, he makes mistakes, like all other men; but, take it by and large, Brigham Young's judgment is as good as that of any man that can be found. And he has wrought out results in agriculture, in railroads and in telegraphs, of such a nature that it may be said there is no man in this country who has equalled him with the same means. He sets in motion the whole of this machinery, and then there are men under him, in subordinate places, setting in motion the machinery in smaller circles, so that, in every settlement, they have a bishop, and the bishop is not only the spiritual leader of the people, but he looks after temporal matters. He is the man to whom they all go for advice; he

receives directions from headquarters, and everything goes according to his will. In this way, you will see that these people, although they may be ignorant, although they may be brought in by ship-loads, and distributed among those settlements, are set to the work they can do the best. The whole thing is organized, and when you go up and down through the Territory, see what they have done, see the amount of labor that they have thrown away, in one sense, in building those great forts to protect themselves and their cattle from the Indians, the roads they have made, the canals they have dug,—why, there are four hundred thousand rods of these canals, besides those minute canals or ditches that lead the waters to every field; really the work they have done is astounding,—when you look at all this, you see that nothing but persistent industry, under a most perfect organization, could have accomplished what has been accomplished in that Territory in the time they have been there. I don't believe the world can show another example to match it. That is an important lesson in regard to what can be done by coöperation. If we could have something that acts spontaneously from the people; if we could have that people or any other work together for the common good, one hour's labor would be worth what two are now. Besides, when you find a people organized like that, they have no time for mischief. Everybody works. When you go away from Salt Lake City down into the Territory, you cannot find any tobacco nor liquor. They do not believe in either. When you take a people like that, temperate, working all the time, and saving, and all working under an organization, you see wonderful results. Poor as they were when they began, and bringing in multitudes of poor people all the time, they are still a comparatively rich people.

The most perfect coöperation is to be found in this water system. The people live in villages. And here is another wise thing. They do not make a farm here, and put a house on the corner of that, and then another farm there, and put a house on the corner of that, and so on; but they put their houses pretty near together. And then their farms are not large; they cannot have large farms on this system. There can be no skinning, where you have to irrigate every foot of land you cultivate. It is condensed husbandry. Here we get another

good thing. Each one can have only a small amount of land, because it must be watered, must be carefully tended, and every single inch must be made to produce all it can. The houses being near together, the people can get readily to church, to the school-houses, and to the places of amusement.

Then comes the time for letting the water on to the crops. From the large canals many small canals come down by each man's land. There must be enough of them, so that each man can have control of one of those canals long enough to perfectly irrigate his lands. That is the problem; and the best men in the community arrange this matter—determine where the canals shall go, how long the water shall be taken from each canal, where it shall be brought in order that the land may be perfectly irrigated; and they decide that such a man can have the water so many hours to-day, and so many hours three days from now. Every man knows the time when he can turn the water on his land, and when it must be turned off; and no matter whether it is midnight, or cock-crowing, or any other time, when that moment comes, he must be ready to turn the water on his land. And not only that, but before that time comes, the ditches must be cleared out, and everything arranged, so that, when the water is turned on, it will go where it is needed. There is no time to lose. The whole system makes men wary and watchful, makes them look out beforehand. A man knows, for instance, that to-night, at twelve o'clock, he may turn the water on to his garden for three hours, and that when it has run three hours, his neighbor can turn it on to his garden, and if he oversleeps, his garden must go dry; there is no help for him. Or if his ditches are not prepared, so that the water can run along readily, his crops must suffer. You see, the man must have everything in readiness, the ditches all arranged properly, and when the time comes, he takes the water from the large canal, and it passes along through the smaller canals in his grounds the length of time that is allowed him, and then the next man takes it. It is so arranged that each man shall have enough for the particular crop that he raises. Nothing but the most perfect coöperation, under a rigid system, could possibly control that thing, among so many people, and with so many interests, when we consider what human nature is;—and I have no doubt there is quite as much human nature

among the Mormons as there is among other people. We have seen some instances of it, at any rate.

You see, then, that the drouth and the frosts they have managed to conquer, to some extent. There is almost always some enemy that is very difficult to conquer; and they have had two enemies there: one is the crickets, and the other the grasshoppers, or the "hoppers," as they call them. The crickets, which came first, they have little trouble from now. They are large, black insects, almost as long as your finger, which came down from the mountains in vast numbers. They came even the first year the Mormons commenced their work there, and they would have eaten up almost the whole of their crops, if they had not turned out in full force, to destroy them. Fortunately, these insects do not fly, and the Mormons dug ditches around their crops, and the women and children stood with mauls and killed the crickets as they fell into the ditches. In this way they destroyed myriads of them. Now occurred a curious thing, that they deem a miracle. When these crickets were so very numerous, there came a bird, in immense numbers, and made war upon them. They call the bird a kind of gull. I have never seen one, but I think it is a gull, or some bird of a similar character. They came, as I said, in immense numbers, and covered the fields. And it seems as though they were made to destroy these insects, for not only would they eat them greedily, but as soon as they were filled, they would throw up what they had eaten, and eat again! They would stand from morning till night killing those crickets. This is vouched for by many persons; and in their books they refer to it as a miracle. As there was no flock of crickets when I was there, and the birds do not come except when the crickets are there, I did not succeed in securing a specimen. The Mormons consider it a kind of sacred bird. One of the most intelligent of their number said to me, when I told him I wanted to get one of these birds, "You could not do anything that would be a greater outrage to the feelings of the old Mormons, who came into this valley first, than to kill one of those birds."

But they have, as I said, another enemy,—the "hopper,"—which they cannot get into these ditches, because they fly in such numbers as really, at times, to darken the sun, like a cloud passing between the sun and the earth. Some facts will show

you the number and the voracity of this insect. This same Mormon told me that the first time they came upon his land, he had a piece of corn planted in a place that I know very well, by the mouth of the cañon, and it was just coming out in tassel. They do not wait until the corn or the grain gets a little hard; they will not injure it then; it is when it is in a soft and succulent state that they attack it. He said that they came to that piece of corn one morning, and the second night after, there was not a single particle of it to be seen. They had not only eaten off every leaf and stalk, but eaten the roots down into the ground, so that the land looked as if no corn had ever been planted upon it. He said, and others have told me, that they have seen one of these flocks come on to a wheat-field in the morning, where the wheat was all headed out, and at night not a vestige could be seen in the whole field; it had been gnawed down into the very ground, just as far as they could find a particle of the plant. And they sometimes not only destroy the first crop, but a second and even a third. They will come upon a fruit-tree, and not only eat every leaf, but they will take every scrap of bark of that year's growth, so that the twigs stand out perfectly bald and white. Sometimes there comes a strong wind and drives them down into Salt Lake, in such quantities that the waves throw them up in perfect winrows, as you see the kelp thrown upon our seashore. Seeing them remain there, year after year, in such masses, gives us some idea of the vast accumulation of animal remains in geological times—we see how such immense masses of animals could be pressed together in some places, when we see such a vast accumulation of these grasshoppers pressed together around this lake.

There seems to be no way to get rid of these pests, because, when they have eaten up all they can find in the valley, they go up on the benches,—dry, hard sand, where nothing will grow,—and there they deposit their eggs. There is no way of getting at them, to destroy them, and the eggs hatch out the next spring, and after a certain time they come down and repeat their ravages. Of course, there are certain times when the season is unfavorable and kills them off, and the Mormons say that they can generally tell the fall beforehand whether there will be any "hoppers" in any given locality the next year. If

a flock comes over and begins to deposit their eggs along the benches, they know what to expect the next season.

This is one evil against which they have to contend. If any one can prescribe a remedy, he will do a great service to that country.

Just before I came on to this platform, some one remarked that he supposed I was going to talk about the Mormon religion. I told him that was not in the programme, but, at the same time, I could manage to throw in a few words in regard to that. I do not believe in their social system which grows out of their religion,—I speak of that system now simply as bearing upon this matter of industry,—I do not believe that their social system is one calculated at all to cause the people to rise to a high state of civilization. I should not refer to it in this connection, were it not to express my opinion on this point. I think the great results I have seen there, and which I have referred to here to-night, have been brought about in spite of a religion that has little tendency to raise men up to a high plane, and of a social system that in my opinion has a tendency to lower men. I say that here as I would say it to them; although I do say that, in my opinion, they have been very much abused, as they have been very much misrepresented. The Mormons, as I have said, went there from persecution. They were persecuted, undoubtedly, and many things that we hear said about them, with reference to their conduct, with reference to their government, arise from the fact that they went there perfectly goaded to desperation. When men have been driven out,—when they have seen their homes burned, when they have seen their friends shot down, when they have been persecuted for their religion, when they have been, as it were, banished, the iron enters into their souls, and they will say and do a great many things, which people on the outside, who know nothing about the situation, think very hard. One intelligent man said to me, "I came over that mountain barefooted, my feet bleeding; I had nothing to live upon, and I went down into that valley and dug wild roots for months to live upon, and I am ready to do that again, if need be." On all other subjects, that man is just as intelligent as you or I, and a man who, on all business matters, would talk as intelligently as any one. And the man of whom I spoke as coming on with me, is building

one of the finest mills in this country; not as large as some in Fall River, but a large mill; and he came on to buy a hundred thousand dollars' worth of machinery. His credit is good for any amount he wants to buy. But when you touch him on the subject of religion, he is as sensitive as we would be; he believes in his religion as firmly as you and I do in ours. But while we say and feel that such Mormons as he are wrong in their belief, they are entitled to kind and careful consideration.

I have not touched upon many aspects of the Mormon problem that I ordinarily touch upon in my lectures. I have simply referred to those subjects which I think important, and which are worthy of the attention of the members of the Board of Agriculture—the subject of physical geography, the relations of different parts of our country to each other, and the organization of labor. But in addition to these, there are very many other things which need to be considered by all our people, and by the legislators of our people, who are dealing with this Mormon problem. They have been misunderstood and belied beyond measure. I have been indignant to hear the talk of men who have been to Salt Lake City a day or two, perhaps, and listened to the stories told around the hotels and stables about those men, stories that I knew were false from beginning to end. Such stories are related and passed on from paper to paper. But these people, who have been so abused, are doing a good work, so far as industry is concerned. They need to reform in regard to their social system. Polygamy ought not to be tolerated in our land. Let it be blotted out. But still, when you have said this, there are many things that can be said in favor of the Mormons, and many things which you can study to advantage among them.

SECOND DAY.

WEDNESDAY, November 22.

The meeting was called to order at 9½ o'clock, by Dr. DURFEE, who called upon Hon. RICHARD GOODMAN, of Lenox, to preside for the day.

Mr. GOODMAN introduced as the first speaker, Dr. JAMES R. NICHOLS, who delivered a lecture on

FOOD OF PLANTS, AND SOURCES OF SUPPLY.

BY DR. JAMES R. NICHOLS.

The most delightful and instructive of the studies connected with the farm, relate to plant-life and the food of plants. It may seem to many that a consideration of the food of plants implies the necessity of a belief in the possession by plants of certain organs or powers of digestion and assimilation; and this belief should be entertained, for it is founded upon fact. Plants do indeed in a most proper sense eat and drink, and they are as capricious in regard to the kind and quality of the food which they demand, as are animals or human beings. It is as interesting to study the nature of the appetite and wants of a stalk of corn or wheat, or a blade of timothy, as that of a child which the mother so carefully and anxiously watches and tends during the weeks and months of early infancy.

What a mystery there is in the life of a plant! It is true, modern science, by the aid of the microscope and chemical analysis, has solved many intricate problems connected with plant-life, which are exceedingly interesting and instructive. The nature of the substances employed in building up the plant-structure is well understood, and also the form of mechanism which is adopted in the first beginnings of growth, and the chemical changes and transformations which occur; but the nature of the *vital force* which guides, and upon which all activity depends, we do not understand, and it is probable that human research will never shed much light upon this mysterious but most interesting problem. The little microscopic cell is the workshop in which great changes are elaborated, and during the season of vegetable growth this is the seat of the most intense activity. Every plant that grows upon our earth, however great or small, must be considered as having originated from a single cell, so infinitesimally minute, that the highest powers of the microscope are required to observe it. If we turn over one of the pebbles common in our brooks, we shall find a slimy material, of a greenish hue, adhering to its under side. This covering is a true plant, but it is one of the lowest of known forms. If we examine it with the microscope, it will be found to be perfect in structure, having an organism so wonderful as to command our admiration. Feeble and insignificant as it is,

it corresponds in structure with the huge oak which grows by the stream and overshadows it with its branches. The plant that adheres to the rock consists of a single cell, but that cell is as perfect and beautiful as any of those which make up the structure of the oak. The tree is but an aggregation of cells,—cells piled upon cells; and the work that is carried on within them is no more complex than that which goes on in the workshop of the humble unicellular plant.

It is with a choice of terms that we designate the cell as the workshop of the plant, in which the materials that enter into its organization are elaborated and fitted to aid in the increase of its substance. The nature of the food which is manipulated within the cell is indeed peculiar, inasmuch as plants gather together the waste products of men and animals, and again fit them for the use of higher organisms. Plant-food is oxidized food—food which it is impossible for animals to assimilate; and the plant, in all its functions and in the objects of its growth, manifestly occupies an intermediate position between ourselves and the insensible rocks. This is absolutely essential to the existence of man upon the earth. Of all the functions of plants, the most remarkable are connected with or related to the solar rays, for they possess the power of utilizing the sun's heat in a way which enables them to pull apart, as it were, some of the most complex and refractory compounds known to modern chemistry. The most tiny, feeble leaf, or blade of grass, has a power in chemical decomposition greater by far than is possessed by Liebig, Boussingault, or any of the great experimenters of the age. The separating in silence, in the quiet of the meadows, by organisms so frail that we can crush them between the thumb and finger, of a compound so fixed as carbonic acid, is one of the marvels in nature which puzzles and confounds the philosopher, and leads him to bow in humility before the God of nature, whose power so infinitely surpasses that of man. But after all, this analytical power of the plant is no less amaz ing than its synthetical capabilities. The work of tearing apart oxidized bodies is immediately followed by that of rearranging the elements, and forming new compounds still more complex, and into these, as a fixed principle, less oxygen is allowed to enter. The great work of the plant is, to disassociate oxygen from compounds, and thus store up energies which are made

apparent when we use vegetable substances as fuel upon our hearthstones, or as food in our bodies. All the forces resulting from heat and muscular exertion have their origin in plants, and however great may be the exhibition of power, the leaves of the trees, and the grasses of the field, have utilized or elaborated it all from the solar rays.

Although the food of plants, as well as the method of appropriating it, differs from that of animals, there are analogies not only apparent but real between them. In animals we have the respiratory functions, and so we have in plants, for plants breathe as truly as we do ourselves; we require our food to be composed of certain elements arranged in certain combinations,—so do plants; we find it essential that our food should be in particular forms or mechanical conditions,—so do plants; we must be regularly supplied with food, and this is the case with plants. These are some of the similarities existing between plants and animals, and serve to show how intimate is the relation which subsists between plants and the higher forms of organized structures.

Although we have learned with certainty regarding the elements essential to plants, and also the forms of combination required, we have yet to learn the exact mode in which they acquire their food, and how they are able to build up such bodies as cellulose, starch, albumen, oil, etc., from these elements. No processes which chemists venture upon in the laboratory are found so difficult as the synthetical production of organic compounds. Indeed, organic chemistry has thus far proved totally incompetent to instruct how to form any one of these bodies from the elements, and for their elaboration we must look solely to the vital chemistry of animals and plants.

It is a well understood fact, that without plants animals could not exist upon our planet. In the wonderful economy of things it is absolutely essential that there should be some intermediate or connecting link between ourselves and the mineral kingdom, and plants constitute this important link in the chain of life. The three kingdoms, animal, vegetable and mineral, are correlated and involved in a cycle of changes which are unintermitting, and wonderful in their nature. We are incapable of being nourished by any form of mineral substances, but such nourish plants, and are transformed by them into vegetable

tissues and products; and subsisting as we do upon plants, we draw support indirectly from the insensible rocks. The plant consumes the rock-dust, and attracts to itself the carbon of air and earth; we transform these into flesh and bones, and, as a last step in this perpetual circulation of matter, after death they relapse again into their dead inorganic condition.

It was formerly thought by chemists that plants lived upon humus, a compound entirely organic in its nature, and when some of the metals were found in the ash of plants they were regarded as accidental ingredients or extraneous bodies which somehow intruded themselves into the incinerated mass. In our time, we know that these mineral bodies enter the vegetable structure as food, and that it cannot exist without them. The mineral portion of plants is small indeed compared with the nitrogenized and carbonaceous parts, and this paucity of the mineral substances was undoubtedly the reason why the early experimenters were led into error.

At present we are acquainted with sixty-three elements or primary bodies, of which all things, animate and inanimate, are made. Twenty-two of these have been found in plants, and therefore are to be regarded as food material. Let us for a moment consider the strange metals and other substances which plants absorb into their structures. Among the metals we find iron, potassium, calcium, sodium, magnesium, manganese, copper, cæsium, rubidium and zinc. It has been stated that arsenic has been found in plants, but this is doubtful. The non-metals are iodine, bromine, fluorine, chlorine, phosphorus, silicon, carbon, hydrogen, nitrogen, oxygen and sulphur. Nothing can appear more singular than the fact that the refractory metal, iron, can find its way into the stalks and leaves of plants, or that the rarer metals should be hunted out of the soil by them and appropriated as food. Some varieties of plants have peculiar appetites and require most extraordinary elements in order to thrive. Tobacco is one of these, and the ash which clings to the end of the smoker's cigar contains substances found in but one or two other plants known to man. Among the rarer bodies are the newly discovered metals cæsium and rubidium, and how or where the plant obtains them is indeed a mystery, as the most delicate chemical tests have failed to detect these elements in soils. In common garden beets, also, the same substances

have been found. Copper has frequently been observed in vegetable products used for food, and, what is very singular, the metal has recently been discovered in the feathers of birds, and some of the tints in the plumage are due to its presence. The fluorine which is found in the enamel of teeth in men and animals, comes from plants, as does also the manganese which accompanies iron in the blood. Aluminium, the metal which, within a few years, has been regarded with special interest, as of great service in the arts, has been found in certain species of Lycopodium, and zinc has been found in the *Viola caliminaria*, a plant common in some sections of France. Bromine and iodine are found in the marine *algæ* or sea-weeds, and for a long time all of these important substances, employed in medicine and the arts, were derived from sea plants cast upon the shore by the waves.

The organic constituents of plants, elaborated or formed from combinations of the elements, carbon, hydrogen, nitrogen and oxygen, make up the largest portion of their bulk, and therefore must be regarded as of essential importance as food. Before considering the sources and value of these agents to vegetable structures, it will be interesting to examine briefly the conditions under which plants start into existence, and the forces or agents which are involved in developing and sustaining the embryo before the plant has the power of seeking its own food.

In all the changes and evolutions constantly going forward in the vegetable world, the sunbeam plays a most important part. Analysis of a sunbeam shows that it possesses three distinct functions or powers. It is capable of supplying light and heat, and also it has *actinic* force, or the capability of producing chemical decomposition and recomposition. Upon the chemical influence of the sun's rays depends the germination of seeds as well as the growth of the plant. We bury the seed in the ground and shut it out from the influence of light, but we do not place it beyond the reach of the sun's actinic influence, for that penetrates like heat to the little earthy couch where the embryo plant lies hid, and arouses it into life. Light, or the luminous rays of the sun, so important to the well-being of the plant, is actually inimical to the excitation of vitality in the seed. How singular is this fact! A series of carefully conducted experiments have proved that seeds will not germinate

in light, although supplied with heat and moisture, when the actinic rays are cut off. Deprived of the luminous rays, with the actinic in full force, they spring into life with great rapidity. Seeds sown upon the surface of the earth will scarcely germinate, as soil cultivators very well know; and on the other hand, seeds buried deep, so that the actinic rays cannot reach them, will certainly perish. The planting of seeds so as to secure the proper distance below the surface is a most important point in husbandry, as it has much to do with the early starting of the plants and the success of the crops.

How beautiful and wonderful is the process of germination, when the chemical and vital phenomena are set in motion by the actinic rays! The starchy particles of the seed become converted into gum and sugar upon which the young plant feeds. The tiny root peeps out from the husk, and with mysteriously directed powers plunges downward into the fertile soil. The slender plumule pushes upward towards the light. The soil cracks and heaves, and the infant vegetable emerges, fresh and moist, into the world of air and sunshine; with the unfolding of the first pair of leaves, and with the first lighting of the sunbeam upon their tender tissues, commences a series of chemico-vital phenomena wholly different from that of the preceding stage of existence. The plant is now fairly dependent for food upon its own energies, and root and leaf are the theatres of great activities.

None of the elements named as constituting the food of plants exist as such in them, save oxygen and nitrogen. Half the weight of a dried plant is carbon, and yet it does not exist in it as free carbon; it is all locked up in combinations of greater or less complexity. There is not one of these elements of food that can be supplied to the plant in its naked condition, as they not only have no power to nourish but are positively poisonous. There is much misapprehension regarding these points among farmers, which arises from not clearly understanding the statements of writers upon the chemistry of agriculture. Not unfrequently inquiries are received concerning the cost of nitrogen, carbon, phosphorus, etc., and sometimes orders are sent for these agents, which are designed to be used for fertilizing purposes. . While it is true that nitrogen is an element needful in the nutrition af plants, it must be presented not

alone, but in one of two forms of combination,—either as ammonia or nitric acid; and further, the acid must be in association with an alkali, as soda or potash, in order to be safely employed by the farmer. In either one of these forms it is of immense value as plant food. Nitrogen is a gaseous body, and has neither taste, color nor smell. It cannot be burned, it will not support combustion, and it cannot be breathed into the lungs. It is a strange, negative element, and yet without its influence not a stalk of corn nor a blade of wheat can grow. It is the most costly of all our fertilizing agents, and yet millions and billions of tons are present in the air constantly, and every plant is surrounded by and immersed in it. Is not this statement perplexing or paradoxical? Nitrogen as it exists in nitrogenous bodies is alone available for plants, and the cheapest source, outside of refuse animal compounds, is in the form of nitrate of soda. This salt, known as Chilian saltpetre, is sold at the present time at about four cents per pound, which makes the nitrogen it contains cost about twenty-eight cents per pound. The nitrogen in sulphate of ammonia, at present market rates, costs thirty-five cents, and I have not found it so readily available or prompt in its action upon my fields. For grass lands, as a top-dressing, the nitrate of soda has proved with me a profitable agent. It brings in the better quality of grasses and largely increases the crops. It should be pulverized fine, mixed with an equal quantity of fine, seasoned peat, and sown evenly over the field, giving to each acre two or three hundred pounds of the salt. Without a supply of nitrogenous food plants become feeble and ultimately die; and hence we must supply it in some form, either as it exists in manure or in commercial substances. The soil does not furnish it in sufficient abundance, neither does the atmosphere in any available form. There is always a little ammonia in moist air, which comes from decaying animal or vegetable matter, and also there are traces of nitric and nitrous acids in rain-water, but these sources of supply are wholly inadequate to the wants of plants upon most fields.

An acre of wheat yielding twenty-five bushels requires, in straw and grain, forty-five pounds of ammonia. The results of careful experiments show that under the most favorable circumstances no more than ten pounds of ammonia is ever supplied to an acre of soil by rain-water; so if all the ammonia of

the rain-fall is assimilated, thirty-five pounds in addition would have to be supplied to meet the wants of the wheat-field.

Carbon, the agent so largely consumed by plants, fortunately costs us nothing. The farmer need not trouble himself concerning this important element in plant-food, for the atmosphere furnishes an abundant supply for all our wants. It is supplied in the form of carbonic acid, and we do not know that it can be assimilated through any other carbon compound. A carbonate, unless it be of potash or soda, is practically valueless to the farmer. Carbonate of lime, in any form, cannot be regarded as a fertilizing substance having a commercial value. Very strenuous attempts have been made to induce farmers to purchase ground clam and oyster shells, the vendors alleging that they were equal to ground bones in fertilizing value; but this is a fraud of a serious nature. Clam shells are composed of carbonate of lime, while bones are made up of the phosphate of lime—quite a different substance, chemically and agriculturally considered. The shells are composed of carbonic acid and lime, the bones of phosphoric acid and lime,—the former acid having no money value, the latter having a high value.

Calcic carbonates should not be confounded with sulphate of lime, which is plaster or gypsum. In this substance sulphuric acid or oil of vitrol is in combination with the lime, in place of carbonic acid, and a very different chemical and fertilizing agent is supplied. It has high value as an application to some fields, although its action is not well understood. The experiments which the writer has made with plaster go to prove that its good effects are due rather to the acid than the lime. It has the power of fixing the ammonia of the atmosphere and forming sulphate of ammonia, which is a salt of much value. In applying gypsum to soils, it must be remembered that but a small quantity can be made available in a season, as it requires nearly five hundred pounds of water to bring one pound of it into solution. Half a ton is a sufficient dressing for an acre of ground.

The element hydrogen is freely supplied to plants by dew, mist and rain, and therefore is costless to the husbandman. It is only through water that hydrogen can be presented to the plant, but this is by no means its only important office. It enters the plant as water, and it is through its agency that all

the various forms of food are rendered assimilable. It is the liquid medium which holds all the inorganic substances, and from the aqueous current which unceasingly flows through the little cells of plants, they are absorbed and appropriated as food.

Enormous quantities of water annually descend upon the land. If the rain-fall be but twenty inches per annum, it corresponds to something like two thousand and twenty tons of water falling upon each acre every year. Much of this is carried off by evaporation or through drainage. Still a large proportion is retained by growing plants or passes through them, aiding in most important functions. It can be shown that a gallon of water passes through a single plant of wheat in a season, and the aqueous exhalations from the broad disc of a common sunflower each day amount to six or eight ounces.

The wonderful substance (formerly rare and costly), phosphorus, is so essential an ingredient in the food of plants that not one of any kind can flourish without it. This highly combustible body, so offensive to taste and smell, and withal so poisonous, enters the plant in combination with oxygen, with which it forms phosphoric acid. The entire supply of phosphorus employed in the arts comes from plants, and they hunt it from the soil atom by atom, and incorporate it into their structures. Animals feeding upon plants abstract the element, and it takes its place in the bones in combination with lime, forming basic phosphate of lime. We gather the bones of the dead animals, and, after calcination, subject them to chemical treatment, and thus isolate the phosphorus in a pure state in large quantities. How curious is this cycle of changes and transformations! We can in no way obtain a clearer conception of them than by reflecting upon the fact that the phosphorus found upon the end of every friction match we use in our dwellings has been gathered from the soil by vegetables, and passing through their organization it has taken its place in the bones of oxen, cows or horses, and from thence passed into the laboratory of the chemist, where it is fitted to subserve the most useful purposes. If this substance had a tongue, what an interesting history of adventures it could unfold!

The amount of phosphorus or phosphoric acid in the soil is usually insufficient to meet the wants of the plant, and hence the farmer must furnish supplies if he wishes to increase his

crops. Formerly there were but two sources of supply, that from manure or animal excrement, and that from the bones of animals; but now we have a third source in the phosphatic deposits found upon the coast of South Carolina. From these substances what are popularly known as superphosphates are made and sold largely in the market.

Potash holds a most important place in the list of substances consumed by plants, and hitherto much anxiety has been manifested regarding a supply equal to our wants. A few years ago we were acquainted with no sources of the agent save that of the ash of plants; and as mineral coal came into use for furnishing household warmth, wood ashes and the potash salts obtained from them became very scarce and costly. Every year the farmer removed from the soil large quantities of potash in his crops which he could not return again through the excrement of his animals, and therefore it was evident his lands were becoming impoverished to an alarming extent. High cultivation, as respects potash, increases this impoverishment, as all cultivated plants are richer in this substance than those growing spontaneously. To obtain a clear understanding of the needs of the soil, it may be stated that an acre of wheat producing twenty-five bushels of grain and three thousand pounds of straw, removes about forty pounds of potash in the crop. Can any farmer conceive of that amount of potash existing in the soil of any one acre of land upon his farm? We know it must be present and within easy reach of the plants, else not a blade of wheat can grow and mature the seed. Nearly all soils of course contain potash, but the quantity is often insufficient for crops of any of the cereal grains. A crop of corn of one hundred bushels to the acre removes, in kernel and stalk, one hundred and fifty pounds of potash and eighty pounds of phosphoric acid. We cannot raise large crops of corn without furnishing potash in some assimilable form; for a small crop of fifty bushels to the acre requires about seventy-five pounds of the agent. A fair crop of oats, say fifty bushels to the acre, removes only about thirteen pounds of potash. Barley and rye remove not far from thirty pounds each.

Now we have observed the great deterioration in our potato crops during the past ten or twenty years; and what is the cause of this alarming decrease of tubers? Can chemistry

point out the reason, or aid in remedying the difficulty? I think it can; and in order to understand the matter it is necessary to understand the kind and amount of food which the potato demands. A field of potatoes yielding three hundred bushels to the acre will remove from the soil in tubers and tops at least four hundred pounds of potash; also it will remove one hundred and fifty pounds of phosphoric acid. Now these amounts are very large, and show that the potato plant is a great consumer of the two substances, and also show that in order to restore our potato fields to their former productive condition, we must supply phosphatic compounds and substances holding potash in large quantities. For six or eight generations in New England our fathers have been exhausting the soil, by removing these agents in their potato and other crops, and we have reached a time when the vegetable is starving in our fields for want of its proper food. Our farmers have found that new land gives the best crops, and this is due to the fact that such fields afford the most potash. But so long as we crop our pastures so unreasonably, we cannot resort to new land, as land is not *new* that has had its potash and phosphatic elements removed by grazing animals. A potato field which gives but one hundred bushels to the acre requires at least one hundred and forty pounds of potash, but by allowing the tops to decay upon the field, sixty pounds are restored to the soil again, as that amount is contained in them. A medium crop of potatoes requires twice as much phosphoric acid as a medium crop of wheat, so that in two years with wheat the land is deprived of no more of the agent than it loses in one year with potatoes.

The aim has been in what has been said, to point out the nature of the materials which plants require, and to impress upon the minds of soil cultivators the great truth that, when they have gained this knowledge, and also learned the quantity necessary for a given crop, the accumulation and use of these materials are as simple as supplying raw materials for making cloth, boots and shoes, or any other manufacture. A field in proper condition for culture should contain, in ample abundance, all the inorganic materials which the intended crop requires, and these materials should be in an assimilable condition, or in other words, they should be in a soluble condition, so that by the aid of water they can be taken up and carried through the

plant organism. The proper manures for wheat and corn are the nitrogenized varieties, or those which hold nitrogen, either in the form of ammonia, or as nitric acid. These should be conjoined with phosphates and potash in considerable amounts. For potatoes, potash, phosphates and lime are required; the latter element, lime, enters largely into the leaves, and is an important article of food for the vegetable. Gypsum, or plaster, which holds lime and sulphurous acid, is a valuable manurial agent for potatoes, especially on moist land. Enough has been said to show that each variety of plants demands peculiar kinds of food, and unless this is supplied by the soil, or through our agency, it is impossible for them to flourish.

The sources of supply of food adapted to the wants of plants, are, for the most part, well understood; still, it may be desirable to devote a few moments to the consideration of this most important subject. We must constantly bear in mind, that there are but three substances consumed by plants which bear a high commercial value, or which, in other words, are of a costly nature. These are *nitrogen*, *phosphoric acid*, and *potash*. The soda, iron, lime, &c, are not substances which, in the amounts demanded, should receive much consideration in estimating the cost of fertilizing material. They are essential, but the soil supplies them usually in sufficient quantities, and when this is not the case, they can be furnished quite cheaply. Animal excrement holds all the substances which plants require in an assimilable condition, and if enough was furnished to meet the wants of agriculture, we should have no occasion to seek for plant-food in other directions. It is best for the farmer to bend every effort to increase his supplies of excrement, and to utilize every pound of excrementitious material from house, barn and stable. It is presumed that all sensible, thrifty farmers do this; and still the want of further supplies of plant-food is most decidedty felt, and anxious inquiries are made as to how the want may be met. I presume it is well known to many of those whom I have the honor to address, that during the past nine years I have endeavored, by extended experiment on a farm, in Essex County, to show that fields can be fertilized and sustained in good tilth by the use of the agents holding plant-food, excluding animal manures altogether. In addresses at former meetings of the State Board,

and before other bodies of husbandmen, I have presented some of the results of these experiments, and as they have been published and read extensively, I do not feel that it is necessary to allude to them any further than to say, that each year, or each successive crop upon my farm, affords additional proof that properly prepared chemical or manufactured fertilizers can be used economically, and with a certainty of favorable results upon our fields. I have raised three tons of hay and three hundred bushels of potatoes to the acre, the past season, upon fields to which not a pound of animal manures had ever been applied. My corn-field gave me, this year, a little more than one hundred bushels of shelled corn to the acre, but this received a moderate dressing of cow dung, with a mixture of bone and ashes applied to the hills. The hay crop upon the farm, the present year, which has been characterized as one of the driest and most unfavorable ever experienced, was rising sixty tons,—an increase over the preceding year of more than ten tons. I give these brief statements to show that the experimental labors commenced nine years ago, continue to afford gratifying evidences of success, and are well calculated to settle some important controverted points in husbandry.

And now let me briefly consider the inquiry of the farmer, who, after exhausting all his supplies of barnyard dung, offal, house waste, &c., asks how and where he can obtain a further supply of plant-food. Shall he be sent into the market to purchase the commercial fertilizers of which the market is full? There are reasons for hesitating to do this.

I have said so much in public addresses and through the journals upon commercial fertilizers, that I ought not to dwell upon the subject here. But I must be permitted to say that the persistent exposure of frauds, and the explanations of the true nature of fertilizing compounds, has had the effect to improve them,—some in an important degree; still, they are generally not what they should be, regard being had to quality and price.

During the past four months we have devoted much time, in the analytical department of the laboratory in my charge, to the careful qualitative and quantitative analysis of the different brands of superphosphates and fertilizing mixtures found in the market. It is the intention to continue these researches, until all the products of the prominent manufacturers have been sub-

mitted to examination, and then the results will be published. It is believed that if the sale of commercial articles is to continue, the exact value of each substance should be understood by purchasers.

In order to show how farmers are subjected to loss in the purchase of manufactured fertilizers, I will present the average cost of seventeen of the most popular superphosphates, the cost having been ascertained from accurate analysis of samples found in the hands of dealers. A portion of these analyses were made in my own laboratory, a part in others, where were obtained unquestionable accuracy of results.

The money value of the seventeen superphosphates averages $16.35 per ton, and the average price at which they are sold by dealers, is $51.25 per ton. These results give an average loss to farmers, upon every ton purchased, of $34.90. Some of the superphosphates, so called, cost the manufacturer less than $10 a ton, but they had a selling price of $50 the ton. The highest cost of any one specimen was $36, which is sold at $60. The loss to the farmer on a ton of the former would be $40, on the latter $22. Now it is evident that none but the most wealthy farmers can afford to buy these products; and it is equally evident, if they purchase many of them, their more sensible neighbors will soon find them objects of support in the poor-house.

A considerable number of these are sold largely in the Southern, New York, Baltimore and Philadelphia markets, and are less known in Boston. The superphosphates, so called, which hold a prominent position in Massachusetts and throughout New England, are what are known as "Bradley's" and "Upton's," and are manufactured in Boston. I will present the results of analysis made in my laboratory, in September, of these compounds. The specimens were procured at the warehouses of the manufacturers, under circumstances to preclude the possibility of deception, and therefore they may be regarded as representing the articles as offered for sale.

Bradley's extra superphosphate held in one hundred parts—

Water, ...	9.76
Organic matter, ...	41.71
Inorganic, ...	48.53
	——100.00

Of the inorganic matter 4.99 parts consisted of sand.

Soluble phosphoric acid, . . .	7 02
Insoluble, " " . . .	12.44
Nitrogen, ...	2.12

This result shows that the superphosphate holds nearly fifteen per cent. of water and sand. It is, however, to be considered, that it is quite impossible to drive off all moisture in manufacturing, and the sand may be an accidental ingredient. In estimating the value of Bradley's superphosphate, if we regard the insoluble phosphoric acid as worthless, as is the practice of some chemists, it reduces the value of the compound to a low point. But this I must regard as erroneous and unfair; it has a positive value, although I do not agree with Prof. Johnson, in estimating it as high as six cents a pound. It is worth to the agriculturist a half that sum, three cents, and the soluble may fairly be estimated at sixteen cents a pound. The nitrogen has a fair market value, based on the price of nitrate of soda and sulphate of ammonia, of about twenty-eight cents. Estimating the superphosphate from these prices of plant-food, the value of a ton is about $36. That is, the manufacturer supplies in each ton thirty-six dollars' worth of plant-food, a considerable part of which is available. The retail price is sixty dollars the ton. This superphosphate certainly contrasts favorably, as regards money value, with many others found in the market.

The Upton phosphates are five in number, all of which have been examined. They hold of water, respectively, eight, thirteen, twenty-one and twenty-five per cent., not reckoning fractions. These amounts are all large, two of them being excessively so. No one of them contains a trace of soluble phosphoric acid, and the amount of insoluble is represented as follows: No. 1, 12.44 parts in 100; No. 2, 15.89; No. 3, 17.02; No. 4, 11.21; No. 5, 11.80. No. 1 contains of nitrogen, 2.12; No. 2, 1.59; No. 3, 1.55; the others none. No. 2 contains 2.38 parts of potash.

Mr. Upton is a well known and highly honorable gentleman, and he states that the making of fertilizers is incidental to his business as glue manufacturer, and that he makes as good an article as he can afford at the prices at which he sells his

products. Whilst it is desirable that more care and uniformity should be observed, and some modifications adopted in fabricating these compounds, the statements made by the house may be regarded as essentially correct. The usual price for the so-called superphosphates is about $60 the ton; the Upton compounds are sold at $28 and $30 the ton, and from an estimate of the value of the plant-food they contain, based upon the analysis, two or three of the varieties are sold at fair market rates. One important point to be kept in mind in regard to commercial fertilizers is, that different parcels are of very unequal value. The chemist is able to give the exact value of a specimen taken from one parcel, but he cannot assure farmers that the article they purchase of the same brand is of equal value. It may be better, or, what is quite as probable, it may be much worse. The purchase of commercial fertilizers is full of risk, under the most favorable conditions, and I cannot point out a way by which it may be obviated. Our State system of inspection and analysis is a kind of legalized quackery, which has fallen so far beneath contempt, in the view of respectable chemists, that it is never alluded to in any estimates of the value of the compounds that are offered for sale. The statements of values, put upon packages, if in any sense accurate, are so presented that the purchaser is confused and misled. This device to protect farmers fails to have any practical value.

But after all, there are inherent difficulties in the business of compounding plant-food, that are worthy of consideration, and which lead to conclusions of an important character. The temptation to enter upon a manufacture, the products of which are of a nature not easily understood, and where there are opportunities for employing inert or worthless materials, is very great, and no wonder the business of fabricating fertilizers is crowded.

After much observation and thought upon the subject, I have reached the conclusion that it is difficult, if not impossible, for manufacturers to supply in a large way, through the ordinary channels of trade, superphosphates, or any compounded fertilizer, so as to give the farmer a just return for his money. The reasons for this conclusion are, that the elements of plant nutrition, or the three most important agents which should enter into fertilizing compounds,—phosphoric acid, potash and nitro-

genous bodies,—have a fixed market value, and the difference in price between their purchase, in moderate or large quantities, is not great enough to give to large manufacturers an advantage worthy the attention of honest men. A bag of nitrate of soda (three hundred pounds) holding nitrogen, or of kainite (chloride of potassum) holding potash, or a ton of bones or coprolites, holding phosphoric acid, can be purchased, at original sources of supply, at a cost but a trifle higher than is placed upon them when large amounts are taken. The margin of cost between large and small quantities of raw materials is not great enough, under usual conditions, to compensate honest men for preparing honest compounds, as the cost of manipulating and handling such heavy and bulky bodies is very great. This cost added to freight, and the commissions to middle men, wholesale and retail dealers, will consume a much larger sum than can be secured by advantages of purchase of raw materials. It is true the owners of sulphuric acid works, and of coprolite deposits, must have considerable advantage, on the score of cost, over those who undertake to manufacture fertilizers in a small way; but this advantage, I contend, is insufficient to afford satisfactory profits when good articles are produced. They do not secure the advantage of half a cent a pound on the acid, as that is a large manufacturer's profit; and a monopoly of any source of phosphoric acid potash, or nitrogenized products, is now almost impossible. A farmer preparing his own fertilizers has an immense pecuniary advantage over a large manufacturer. He can prepare them in seasons of leisure, when the time consumed in manipulation does not enter in as an element of cost. He saves the commissions paid to large and small dealers, he saves in cost of transportation, and he can purchase pure raw materials at nearly as good advantage as the manufacturer. Why should not the farmer prepare his own fertilizers? It requires but a small amount of skill; but if the farmer feels that he is not sufficiently well educated or experienced, he must remove these disabilities at once, by reading, study and experiment. The farmer of the period, to succeed, must be competent to prepare the food necessary for the plant children of his fields, or else he must expect to be left behind in the work of profitable husbandry.

It may be objected that purchasers of raw materials would be liable to become the victims of frauds, the same as when purchasing manufactured fertilizers; but such is not the case. As a source of nitrogen, nitrate of soda, in crystals, can be bought of importers with guarantees of a certain percentage of pure nitrate, and the crystals usually analyze from ninety to ninety-five per cent. So also the muriate of potash is sold with a guarantee that it is eighty-six or ninety per cent. pure, and these guarantees are quite reliable. Bone in flour, as a source of phosphoric acid, is the most hazardous to purchase; but whole bones can be secured, calcined and ground, and thus all risk is removed. Other sources of supply of the three great essentials of plant-food, do not offer any greater risks of deception than those mentioned.

Allow me to present a formula for a compounded fertilizer, which has proved of the highest value, and which can be readily prepared. I have used bone charcoal from the sugar refiners, as a cheap source of phosphoric acid, but burnt bones may be used instead, at about the same cost, and with fully as good results.

Take nine hundred pounds of bone charcoal, four hundred and eighty-six pounds of oil of vitriol, one hundred and seventy-one pounds of water; mix the water with the acid, and gradually add the bones, stirring the mass, that it may be fully acted upon. This affords a superphosphate which is dry enough to be ground, as soon as it is cool, and it can be ground in a plaster mill. To this add four hundred pounds of nitrate of soda, one hundred pounds of muriate of potash in powder, and we have a ton of fertilizing material, which I have found, upon analysis, gives 14 39 parts in the 100 of soluble phosphoric acid, 27.47 parts of soluble phosphate of lime, 2.8 of potassa, 3.14 of nitrogen. This gives twice as much soluble phosphoric acid as Bradley's compound, and more nitrogen. The cost of materials, at present market rates, will be about $44. Its actual money value, estimating the active fertilizing principle, according to Prof. Johnson's prices, is a little more than $68, but those prices are too high, and its value would be more correctly estimated, calling it $57. This is a saving worthy the attention of every soil cultivator, and it affords a fertilizing compound of the highest efficacy.

But I fear to weary you by longer dwelling upon these points. They are, however, of the highest importance to the interests of agriculture, and should be attentively considered.

There has never been a time when soil cultivation, as a pursuit, was more hopeful or promising than the present. We have just learned the important fact that an abundance of plant-food has been stored up for our use in mines and rocks, and that we have only to reach out our hands and take all that we require. Ten years ago who could have dreamed even of such vast deposits of potash as have been opened up to us at Stassfurth salt mines, in Germany? Some idea of the supply may be formed from the fact, that at the present time more potash is furnished from these mines, than from the wood-ash sources of supply of the whole world. Only about thirteen thousand tons of potash were sent to market from the United States and British America in 1870, and yet from Stassfurth, where a dozen years ago it was not supposed that a single ton could be procured, thirty thousand tons of the muriate of potash were manufactured and supplied to consumers upon both continents, during the past year. The surface salts at these mines, which hold the potash, are practically inexhaustible, and millions of tons will be supplied in succeeding years. No doubt our own salt mines will be found, upon careful examination, to afford potash, and hence we may look with confidence to the rapid cheapening of this most useful product.

Ten years ago, who could have supposed that, along the river beds upon the coast of South Carolina, there were millions of tons of rocks holding that important element of plant-food, phosphoric acid? These rocks were indeed known, but their important character was not understood. The phosphatic rock beds of that region extend over an area of several hundred square miles, and in some places they are twelve feet thick. It is estimated that from five hundred to a thousand tons underlie each acre. How vast is this supply of an agent of the highest importance to agriculture, and what a source of national wealth it opens to us!

Two important considerations force themselves upon our attention. One is, that nature has provided ample materials to supply all our wants. In mountains, and caverns, and streams she has deposited all elements and combinations which are

essential for our well-being and progress, and it is unreasonable and wicked to doubt regarding the future. The other is, that science must be sustained and fostered, for it holds the key which is alone capable of unlocking nature's storehouses, and bringing forth from the dark recesses of earth those rich materials which have been provided for our sustentation and happiness.

The CHAIRMAN. I apprehend that we are all well satisfied with this lecture. It has given us just the information we want at this crisis. A great many of our farming friends are complaining of the lowness of the price of certain products, and that the prospect for the farmer is very discouraging. And when we add to the low price of our products, the high cost of labor, and the amount of taxes we have to pay, there is naturally some discouragement, and therefore it is a source of great satisfaction when we find that we can get information from such a source as we have obtained it to-day, which will enable us to cultivate our farms at a cheaper rate, and thus secure an increased profit.

We all know that within a few years, there has been a great advancement in this matter of scientific agriculture. In old classic times, the people knew nothing about scientific methods of cultivation, and there were various devices practised to insure a good crop. For instance: it was considered that the best time to plant was on the full of the moon; and it was considered that a very certain way to propagate vegetables was by planting asses' heads in the middle of the garden. Unfortunately, all the asses' heads were not buried in that way, and a great many have been braying ever since against scientific agriculture. But we have seen that, through the means of agricultural colleges, and through the means of gentlemen like the lecturer before us, who have taken up scientific agriculture as a pursuit, great benefit has been derived by our farming community. I think it will strike you now, as it has heretofore struck us, when we have had lectures of a similar character, that there is no more certain way to advance agricultural pursuits than for each man to try the experiments which have been mentioned, especially in relation to manures.

In the region where I live, we find it impossible to get along without a certain amount of artificial manures. We cannot

get together enough animal manures to grow our crops; and in addition to that, we want something to start them with, and every farmer in our region finds that his crop is increased, is driven ahead, and gets beyond the reach of frosts, by the use of some of the phosphates. We find that we are not successful in raising large crops if we do not put some manure in the hill. But these things are ordinarily so expensive that it is only occasionally that farmers are using them in large quantities. Now, if we can obtain them in the methods which have been mentioned, we can increase our crops at very small expense, and our farms will be generally benefited.

Now I want to remind you that the whole subject is open for discussion. It is true, we cannot all discuss it in the scientific method which the lecturer has followed. It is a good deal like the alphabet, that the boy said he knew by sight, but he couldn't tell the names of the letters. But we have practical knowledge of certain matters connected with our farming operations, which will prove profitable themes for discussion this morning. In the first place, there is the subject, sometimes discussed, of the value of gypsum. We have found it very necessary to use a great deal of gypsum—plaster of paris. We find it of great advantage to us in the spring upon certain soils. Then it is a question whether it can be used to advantage upon any soil except those which are dry. Then there is another question in relation to hard-coal ashes. A great many farmers throw away their coal ashes; and as coal is being used all through our farming region, the question has become one of very great importance, whether some use cannot be made of the residuum of our furnaces. I have heard gentlemen say that they have used coal ashes with very great advantage. They have found that coal ashes, put around their fruit-trees, produced results which they did not anticipate. In Pennsylvania, where bituminous coal is consumed, we find some crops almost entirely manured by those ashes. When I was there, this last season, I saw some potatoes that were raised with no other manure. I had no doubt, from what I saw there, that those ashes were of some value. Then in relation to bones. A great many farmers have found them to be, in the end, the cheapest manure, and the most lasting in their effects, even when used in the natural state. We know that in the old country, their

pasture lands are kept up, with comparatively little expense, by giving them bones, in quantities such as we should never dream of—a ton, for instance, to the acre; by which they say their cattle thrive better, their pastures are kept up better, and they find that the cheapest mode of fertilizing them. We use them differently. We find that by ploughing in bones, on new land, we can improve the land, until we have time to make animal manure.

These subjects are all open to us, and Dr. Nichols has always been kind enough to answer the questions put to him, and I have no doubt he will be ready to do so now.

Mr. Hyde. I will ask Dr. Nichols how he would apply potash to potatoes?

Dr. Nichols. At present, the cheapest source of potash is the German muriate of potash. I have just received a few tons of it. You can obtain it in Baltimore, of Mr. ———, who is the agent of the German importers. It costs me, set down upon my farm, about $54 a ton, and it analyzes ninety per cent. muriate of potash. Reducing the potash down to the oxide of potassium, that would make it cost about 3⅞ cents a pound. The ordinary commercial potash cannot be bought for less than seven or eight cents a pound. The best article is worth nine cents. If any one wishes to have as much as a ton, I would recommend him to send to Baltimore and obtain it there. I think it could be landed anywhere in Massachusetts at less than $60 a ton, and in combination with compost it is very excellent indeed. But if you wish to use the ordinary potash of commerce, the best way is to get a large iron kettle and dissolve it, and then add to the solution a quantity of dry muck, of course making an estimate of the number of pounds that you use and the bulk, and then use that in your compost heap.

Mr. Hyde. Would you mix the first you spoke of with muck also?

Dr. Nichols. Yes, sir, I would add that.

Mr. Hyde. How many cords of muck to a ton of the potash?

Dr. Nichols. I do not attenuate it very much. You can attenuate it down to any extent you choose, but you would make the bulk so large that it would be inconvenient to use it. You want to make the bulk considerable. I find it is an advan

tage to use all these concentrated fertilizers with muck, in order to increase the bulk. Of course we cannot get any particular benefit from the muck that we use; we do a little, but it is very trifling. But it is very useful to extend these very powerful commercial fertilizers, for it enables us to use them more conveniently over our fields. I use it in that way, because it is very much more convenient; but I would not advise you to use muck very largely, because, if you are going to haul it upon moist land, of course you meet with difficulty. You want something that you can take readily upon your meadows, and sow it in that way. The formula I have given here I have found to be very excellent. It may be that some will feel that it is too troublesome to make these superphosphates that I have indicated here, but I cannot help thinking that we can all do it; it is very easy and simple. I really wish I could have all the gentlemen here with me half a day; I think I could show them the whole mystery of the thing. I have found so much benefit from that product, that I really wish everybody could make it.

Prof. CHADBOURNE. How much of the muriate would you apply to the acre, as a top-dressing?

Dr. NICHOLS. It depends upon the crop.

Prof. CHADBOURNE. I refer to grass lands.

Dr. NICHOLS. I use the nitrate of soda for grass land. We need the nitrogenous element for that. For my cereals, I usually average my compost so as to give about one hundred and fifty pounds of potash to the acre. On a worn-out field, I should use more. I should exercise my judgment about that. Nitrate of soda can be bought for about $3\frac{1}{2}$ cents a pound, which will analyze about eighty-five per cent. I think that is a great deal cheaper.

These things, gentlemen, are all very hopeful. I always have a certain feeling of embarrassment in bringing these matters before my farming friends, because I do not know how they may strike them. My object has been to show what great encouragement we have. I hesitate to give formulas; I hesitate to state positively what you can do; but I have no hesitation in saying what can be done, and what I think every one can do; but it requires a little experience and a little patience. I think you cannot fail to see that the future is hope-

ful—much more so than when I gave my lecture in Salem three years ago. I was thinking, as I came into the hall, of an expression that I used in 1868, in relation to the sources of supply of plant-food. I said then that I could not point out any satisfactory source of potash or phosphates. I was aware then that the Stassfurth mines, in Germany, were producing considerable quantities of potash, but none of us understood then the extent of those deposits, and therefore I made that observation with a feeling of deep regret that I could not point out any sources of supply for these very important elements of plant-food. But now, as I come here to-day, only three years having elapsed, I am enabled to say that I can point out sources of potash and phosphoric acid which are inexhaustible. I think that is very hopeful. And we have also made great progress in the combining of these things. We have disturbed those men who are engaged in the business of making fertilizers. We have really frightened them into making a better article, which yet is very poor. I really would like to have you see the character of the letters I get from all over the country, in relation to this matter. I have one in my pocket from a gentleman who is manufacturing a fertilizer very largely. He says he meets with certain difficulties, and proceeds to give the formula from which it is made, and wishes to be instructed in certain matters about it. I was so filled with contempt on reading it, that I have not answered the letter. To show the deception, I will say, that he was actually making the fertilizer at a cost of $7.50 a ton, of which he frankly confessed he was selling large quantities for $50 a ton. I think it is high time this kind of fraud was stopped.

Mr. BUFFINTON. I use this potash, and the way I mix it is this. I have the street scrapings of the main streets of the city drawn down to my place, and then I have hogsheads placed as near the heap as I can, into which I conduct the water from the sink drain, and fill those hogsheads, and put in from fifty to seventy-five pounds of this crude potash, mix it, and then throw it on to this heap, so that I get one hundred or one hundred and fifty pounds of the potash to the acre.

This matter of potash is a very important one in this vicinity. I am satisfied that all our land needs it, and it is about the only cheap manure that we can get hold of. I have found one

hundred and fifty pounds to the acre too much for potatoes. It acted like an acid in the hill, and made the skins rough. I have reduced it down to fifty pounds, and it increased the crop from one hundred to two hundred or three hundred per cent.

Dr. NICHOLS. The matter of dollars and cents, of course, overrides everything else. We farm, not for pleasure, but profit. In addition to sources of supply, we want to find the *cheapest* sources. I suppose the gentleman pays 7½ cents a pound for his potash. Wood ashes would be cheaper, if he paid thirty-five cents a bushel.

Mr. BUFFINTON. I cannot get them for less than forty or forty-five cents a bushel, with a great deal of coal ashes mixed with them.

Dr. NICHOLS. I should hope no one would sell wood ashes for less than forty cents, because, from a bushel of wood ashes, you get four pounds of potash, and then you have some soda, a considerable amount of soluble silica, and a very considerable amount of phosphate of lime. You have the material in a bushel of ashes that really makes its money value as high as forty cents.

Dr. DURFEE. In what way would you manage these ashes, if you had plenty of them? I have plenty of them, and I should like to know how to use them to the best advantage. I have been buying ground bone and making a compost. The ashes eat up the bone, and I find it makes a most excellent dressing for land, especially for vegetables.

Dr. NICHOLS. Well, doctor, you cannot make much improvement upon that. You see, in mixing ashes with bone, you get all the essentials of plant-food. You get the gelatine in the bone; you get nitrogen, potash and soda; what more can you have? I have for several years recommended that mixture, and some have told me that it did not succeed very well upon corn; but I have found that they did not use judgment in its application. They would drop the seed upon the fertilizer, and in that way destroy the germinal principle. A considerable quantity of earth should be put upon the compost before the seed is dropped. I think that the use of half a handful in a hill brings the corn up quickly, and makes a magnificent growth. I consider that it is a very profitable fertilizer to use

upon corn. I think you are quite right in your manipulation of ashes.

I will say a word in relation to leached ashes, in which I presume there may be some interest felt. Of course, when a soap-boiler leaches ashes, he leaches out everything that is soluble in hot water, and of course he removes a very large portion of the soluble potash and soluble soda, and those are the two important elements that he removes. He leaves the phosphoric acid, he leaves a certain amount of soluble silica,—that is, it is soluble to plants,—and he leaves the lime ; and, upon the whole, he leaves a considerable amount of fertilizing substances in his leached ashes. Now, as regards the value of leached ashes, I think I said last year, that I regarded them as worth from fourteen to seventeen cents a bushel, but I cannot, of course, state the precise value, because some soap-makers will rob them more than others. I have never been able to find two specimens exactly alike. Some soap-makers will manipulate them longer, and exhaust them more thoroughly ; but I think leached ashes a very cheap fertilizer, at about one-half the price of dry ashes.

Mr. Buffinton. What is you idea of the quantity of ashes to be used on an acre ?

Dr. Nichols. I should estimate dry wood ashes as having four pounds of potash, and make my application in accordance with that estimate. I should say twenty-five bushels to the acre would give it a very good dressing ; fifty would perhaps be better.

Mr. Buffinton. Fifty would be better than a hundred ?

Dr. Nichols. Yes, sir, I think that fifty would be better than a hundred.

Mr. Boise. I would like to ask the doctor if he can tell me the difference between the hard, gray plaster, and the new variegated plaster. We have generally used, in our section of the State, the hard, gray plaster, and that has proved very beneficial. A year ago last winter, I was shown some plaster at the Southville station, on the Boston and Albany Railroad, which was variegated in color, and which was spoken of as much more valuable. I obtained some last season, and tried the two kinds side by side, and I could see a marked difference in favor of the soft, variegated plaster.

Dr. NICHOLS. I think that is quite an important point. The gray plaster is made gray by a little trace of iron. I bought twelve tons of plaster the past autumn, but I did not buy it until I had made an analysis of it. Some plaster is largely carbonate of lime, which is an adulteration of sulphate of lime. The real, genuine plaster, is sulphate of lime. The gray tinge in plaster is due to iron. I have observed that there is less carbonate of lime in this gray tinged plaster than in the other. The trace of iron in it is not of any very great consequence, but I find that wherever there are traces of iron, there is less of the carbonate; there are not so many veins of carbonate running through. So that even in buying plaster, I think it is quite important, if we are going to buy a very large quantity, to have it analyzed.

QUESTION. How is the manurial value of the phosphates obtained from those Southern rocks?

Dr. NICHOLS. These phosphatic deposits at Charleston analyze about sixty-five per cent. of phosphate of lime. I found that the specimens of superphosphate, made from the Charleston phosphates, were poor; that the powder was not properly acted upon by the acid. Now, if you buy a bag of these phosphates from Charleston, and only half as much sulphuric acid is added to it as it ought to have, the other part is of no more value to you than sand; it is an entirely inert element, so far as plant-food is concerned, unless it is changed by sulphuric acid; therefore, the manufacturers of these phosphates at Charleston, S. C., can deceive by not properly manufacturing them. I have found some specimens where one-half of the superphosphate was wholly inert. You may take that Charleston rock, powder it up and put it on your land, and it will have no more effect than so much sand; it is perfectly insoluble. But when that powder is acted upon by sulphuric acid, you liberate the phosphoric acid, and then you get a superphosphate that will tell upon your land. I think that fact shows very clearly the value of chemical experiments. You can see what a miserable product can be made from a good material by improper manipulation. I am told that they are now grinding up these Charleston phosphates in Connecticut, and using what is called "chamber" acid,—that is, sulphuric acid, before it is concentrated,—to act upon the phosphates; and I apprehend that they do not

change more than one-half of the powder, leaving the other half entirely inert. You may put it upon your ground, and it will remain there as long as you live, and you will never get any benefit from it. But of course, these deposits are very wonderful. I know of nothing so interesting. I think they show us that the Almighty is very watchful over our interests. I think we cannot escape from the conviction that these things are all provided for us. I did not suppose it possible that a source of phosphoric acid could be opened to us equal to that in South Carolina; and it is a mystery now how those deposits happen to be there. A number of theories have been advanced to account for it, but it is still a very great mystery. The deposit is perfectly immense, and I think the supply of potash at Stassfurth is equally great. It shows, I think, that as civilization progresses and science is developed, all these things are opened up to us. I never have doubted, for a moment, that a sufficiency of plant-food would be provided for us. Of course, we cannot expect to obtain animal excrement enough to meet our purposes; we must resort to these sources of plant-food, and we must all of us do what we can to bring them out, and develop the inestimable gifts which the Almighty has provided for us.

Mr. BUFFINTON. Is there any real manurial value in the shells that come in the phosphates, if ground up and put upon the soil?

Dr. NICHOLS. Oh, no, sir.

Mr. BUFFINTON. I had some at home, and tried the experiment, and could find no evidence of any benefit from it.

Dr. NICHOLS. Not at all. It is so firmly locked up that you might as well put on sand, or any other inert substance. But by chemical manipulation, by the use of sulphuric acid, of course you develop it, the same as you do in the case of bones.

Mr. BUFFINTON. Those deposits were no doubt made from mussels or shell-fish. Why should not our oyster shells be valuable, if put through the same process?

Dr. NICHOLS. No, sir, that is not the source of them. The theory I have in relation to them is this, and I think my idea is supported by the deep-sea dredgings that have taken place on our coast, in charge of our Coast Survey. I think the deposits of these phosphates have been going on for ages, and are going

on still. Those deep-sea dredgings have shown that the bones of the sea-cow, which are carried down the River Amazon in very large quantities, are swept by the ocean currents into deep-sea basins, and they accumulate there. In the bones of these animals and some others, the phosphates are abundant; but you will never get phosphates from a clam shell or oyster shell. Those are carbonates of lime. If that was the source of those deposits, it would be very easy to account for them; but it is not so.

Mr. BUFFINTON. We dig the muck out of the river here, where we have a great many shell-fish, and we find it makes a very good manure.

Dr. NICHOLS. Oh, yes, sir; that is nitrogenous. You get nitrogen from those deposits.

Dr. DURFEE. About a year ago, my gardener took the pains to dig up his grape border and put in a large quantity of oyster shells. I would like to know what value there was in that operation; whether the doctor considers that that was of any utility or any usefulness to the vine, in the production of grapes? If I understand his remarks on the subject of shells, there is very little value in common oyster shells as a fertilizer.

Dr. NICHOLS. I would say, in relation to that, that there may be a slight advantage, a mechanical one, perhaps it might be called, if it be any advantage to keep the soil porous. I think if you should open your beds you would find that the little rootlets had run in around the shells and twined about them. The tendrils of vines love to twine about something; they will twine around stones in precisely the same way. But the amount of decomposition that goes on would not afford any especial nutriment. There would be no fertilizing influence of any account. Perhaps in a great length of time there would be a little developed, but it would not be sufficient to pay for placing them there. If there was any advantage, I should say it would be mechanical. It used to be quite common to place bones in grape borders, and inasmuch as the tendrils of the vines would twine about the bones, the inference was that they were serviceable. But I have taken up bones from a grape border that had been down twelve years, and I could not detect any loss that was appreciable.

Dr. DURFEE. In the early history of grape growing, I took all the dead horses I could find and buried them in the borders. I supposed there was some fertility about them.

Dr. NICHOLS. Yes, sir.

Mr. PHINNEY. I would like to inquire of Dr. Nichols whether he has examined, for his own satisfaction even, the value of the deposits that have recently been discovered in South Carolina. One of the largest manufactures in this State is in this immediate vicinity, large cargoes are constantly coming here, and it is likely that the article is quite generally coming into market; but how far it may be serviceable to the farmer is yet to be ascertained, I suppose. I should like to know how far he may have examined these deposits, to ascertain their value.

Dr. NICHOLS. I made an analysis of those rocks when they were first discovered, and of course I was incidentally made acquainted with the value of them; and I would repeat what I said before, that the whole value of those rocks to the farmer, depends upon the treatment. If they are properly treated, chemically acted upon, they will be valuable. I wish to make a distinction here between bones and these phosphatic rocks. We obtain phosphoric acid from bones, and also from these rocks; but in the case of bones, we obtain the nitrogen which is found in the gelatine of the bones. We do not get any of that element in those rocks; we simply get phosphoric acid. But I see no reason to doubt the high utility of those phosphates, if they are properly manufactured. The phosphoric acid that comes from those rocks is precisely as good for plants as that obtained from bones, but it must be liberated, and must be acted upon; and if anybody is half making them, or imperfectly making them, of course, if anybody buys these products, he will be deceived, he will be cheated. But if properly acted upon, the farmer will get a product that will be serviceable to his crops.

Prof. CHADBOURNE. What is the physical character of those rocks? I have never been able to examine them.

Dr. NICHOLS. The upper strata of those rocks have a considerable amount of shells incorporated with them, but as you go down deeper, those disappear entirely.

Prof. CHADBOURNE. What sort of shells?

Dr. NICHOLS. Small coast shells, that have been mechanically incorporated with them.

Mr. HARLOW of Shrewsbury. I have been exceedingly interested in this lecture and in this discussion. I have taken considerable pains to come to this meeting, thinking I should be paid by what I should hear, and I believe I have been. The subject which I particularly desired to hear discussed was the one treated this morning,—the food of plants, particularly the grass plants. I have followed farming for a few years, and I cannot make it pay, unless I have the grass crop. What I wish to ascertain is, whether any article can be purchased that we can sow broadcast upon our pastures and our mowing lands, and have more dollars come back than we lay out. I know we can apply ashes and plaster, but I wish something that will produce a greater effect.

I have tried some experiments in sowing ashes and bones. Coal ashes have been spoken of. Four years ago, I took quite a large quantity of coal ashes and sowed them upon a piece ten rods square. I have watched that piece closely ever since, and not an extra spear of grass has grown upon it. I also purchased a quantity of bone, as pure as any that could be found, ground very fine, and in seeding down a piece of land, I sowed it to barley, and applied the bone, five hundred pounds to a half acre, leaving strips where I put none. I don't think there was a spear of grass extra grew upon that half acre. Another experiment that I tried was this. I had a piece of pasture land of fifteen acres, that has been fed for a hundred years, I presume, and I do not know but longer. On four acres of that piece, I sowed about a hundred bushels of ashes, and there has more feed grown upon those four acres than upon all the rest of the fifteen. Unleached ashes is the only thing I have ever applied that has paid me what it cost. I hoped, in coming here, that I should receive information where to go to purchase an article that it would pay to sow upon my pasture lands and mowings.

Mr. BUFFINTON. A year ago last August, I was drawing some gas lime from the gas works, and I saw Dr. Durfee's team drawing away oyster-shell lime. I took it for granted it was going on to his land, and I thought if it was good for the doctor, it would be good for me, and I would draw some of it on to my land. I used it in the same way that I should plaster, and I am

satisfied that it is worth more than plaster, on grass land or in the potato hill. But when I came to inquire, I found the doctor did not use it for manure. I would like to ask the doctor what he does with the leavings of that.

Dr. DURFEE. I use it to stop the leaks in my retorts, where I make the acid for the print works.

Mr. BUFFINTON. Do you use the leavings on your land?

Dr. DURFEE. It goes in with the wood ashes. There is not a great deal of it. We use it simply to plaster up the iron retorts. It makes a very fine plaster to stop up the cracks where the gas comes out. We can stop them very readily by making this lime into the form of putty and putting it on. In setting our retorts, we use it as we would any lime,—use it around our fire-brick.

Dr. NICHOLS. We should always bear in mind this fact,—that there are certain articles which are not to be regarded as plant-food, and other articles which are to be regarded as plant-food. Take, for example, clam and oyster shells. I stand up here and say, that ground clam and oyster shells have no fertilizing effects upon plants. This gentleman (Mr. Buffinton) gets up and says, "You must have been mistaken, because I have gone down to the gas works, and taken the gas lime and put it on my land, and it has had a good effect!" Now just look at that. The shell lime you get there has been burned; the carbonic acid has been driven off; it is no longer carbonate of lime. You have now quicklime, and your land is benefited by quicklime. If you had taken those shells before they were burned, pounded them up, and put them on your land, the land would have received no benefit from them. You see they have been burned, and that makes a very great difference.

Mr. BUFFINTON. Have you not made the statement that oyster-shell lime was not worth anything?

Dr. NICHOLS. No, sir. It does not matter from what source we get our lime. I do not know that burnt oyster shells are any better than burnt marble. Many of our lands are very much improved by liming. In Pennsylvania they lime their lands very extensively, and I think that there are many of our Massachusetts farms that would be benefited by lime. If you can get any shell lime from the gas works, I think it would pay

for hauling; but I would not advise you to buy oyster shells and grind them, and then put them on your land.

Then allow me say, as to the effect of coal ashes, that we must take a good many things into account. One gentleman says he tried coal ashes, and did not get any benefit. Now, if you use coal ashes from places where a large amount of wood or charcoal is used for kindling, you see you get a pretty large per cent., five or ten per cent., of wood ashes: two hundred pounds in a ton. That would pay for hauling. There is four or five per cent. of soluble matter in anthracite coal ashes, that is all; but spread upon moist land, meadow land, it will have about the effect of sand. If you cart a load of coal ashes upon a moist meadow, and cover that land with the ashes, I think it will usually have a good effect; and so will a load of sand have a good effect. It supplies silica, to some extent. I think we should take these things into account.

I do hope, gentlemen, that we shall not be misled about this matter of experiment; if we are, we shall be the greatest sufferers. We want to keep in view certain principles in agriculture, and do not let us be turned aside from them. I feel sometimes that our agricultural papers make a mistake. In farming, there are certain points that I think we must assume to be settled. And when a thing is settled, we ought not to keep opening it up and bringing it back again into the field of controversy. But this is constantly done in farming. There is so much doubt excited by these experiments, which, if they were explained, really would amount to nothing, that we get a little confused. I do not know how we shall ever remedy this to any very great extent, but I think this meeting will remedy it to some extent. I think we want to settle down upon sure principles in farming. There are certain facts proved, and we must seize hold of them and hold on to them, and add something more to them as we can; and in that way we shall bring agriculture to as near a scientific basis as we can. That is the only way in which we can make progress. If we settle a fact to-day, and some man who does not know anything about it, upsets it to-morrow, we shall never make any progress. We must, in the first place, understand what plant-food is, and we do know what plant-food is. Then we must know the conditions under which it is assimilated, and we do know those conditions. Then we must not be mis-

led by supposing that a piece of iron or a clam shell or oyster shell is a manurial substance, when it is fixed and certain that it is not. We must cling to what we do know, and keep progressing.

Prof. CHADBOURNE. I think it was last year, or the year before, that I delivered a lecture before this Board that seemed to strike some as containing very strange doctrine; but it was mainly a recapitulation of experiments that had been tried in relation to farming, and tried under the very best circumstances that experiments could be tried, and the results were very wonderful in showing how little reliance we can place upon a single experiment. Now, I wish to say a word upon one point which the doctor has made. He says, when we have become satisfied on a single point, we ought not to bring it back into the field of controversy. That is true,—when we can become satisfied upon that point. But now another thing. He says that we are to bring agriculture down to a scientific basis, just as fast as we possibly can. I agree to that fully; but I think we are to take it for granted that agriculture is to-day very far from an accurate scientific basis, and that it will remain so for a great length of time. And I say this, because I feel the necessity of every man's studying his own farm. I insisted upon that in that lecture. Suppose I am told, for instance, that plaster, about which we have been talking this morning, is a good thing to apply to land. Well, I go home to Williamstown, and I know one piece of land to which I applied plaster, and I might just as well have applied sand or ground diamonds, if I had them, so far as any fertilizing effect is concerned. Right up above it, on the side hill, if you spread plaster on the land, you can see the effects of it clear across the town. I have considered that plaster is a fertilizer, and I go and put it on one place, and it produces no effect, and I put it on another place, and the effect can be seen, as I have said, clear across the town. Now, I come back and want this thing explained. I understand that plaster is a good fertilizer, and I did not understand, and do not understand to-day (I am honest about it), why it has no effect upon that piece of land to which I have referred. I feel that with all our science, and all the general rules we can lay down, there are still very many things which we do not understand. "The value of that observation," as Jack Bunsby says,

"is in the application of it," and this is the application: that every one must study his own farm, and every single rod of it. And that is the reason I believe in agriculture as a thing for men who have brains, and who are going to cultivate their brains, because the time will never come when a man can go on a farm, and run it as a locomotive can run on the track. He must study it every moment of the time, from spring to fall, and every new farm he gets, he must study. A doctor who is called to visit a patient, not only studies the general principles of medicine, and seeks to apply them to that individual case, but he studies the patient, and tries to ascertain his characteristics, and in order to get hold of them, he endeavors to find what were the characteristics of his family back of him, and he brings them all to bear upon the particular case. If he does not do that, he is no physician. And so it is with the farmer. Every single farm must be studied by every man who would cultivate it to the best advantage, and that will continue just as long as this world stands; and I am glad of it.

Mr. Sturtevant, of Framingham. I have tried plaster with great success on one piece of land, and I have tried it on another piece with no success. I can give an explanation of that which is satisfactory to myself. The land which did not show any result had a supply and required no more; the other piece required it for plant-food, and there I saw a result.

Mr. Hyde. If I may be pardoned a word, I will say, in relation to this matter of coal ashes, that some few years ago, when engaged in the nursery business, as well as farming, to some extent, it occurred to me that a great deal of coal ashes were going to waste, and that they contained some plant-food. I accordingly carted them, year after year, in considerable quantities. You may ask why I carted them year after year, when I tell you what result followed. The first year, the ashes were from red-ash coal. I did not think so much of it at the time, but I am satisfied there was a good deal of wood used in kindling the fires. I know that some of the fires in the houses where that coal was used were kindled daily. I afterwards carted the ashes from a village near us, where white-ash coal was used in the house furnaces, that are run for a month or two months together, or all winter, as I run mine, so that kindlings are used but two or three times during the winter, and very little wood ashes

made; and I am free to say, that after very careful observation, year after year, without any analysis, for I am not a chemist, I came to the conclusion that it did not pay me to cart coal ashes a mile and apply them to my fields. Then I used them as an absorbent of night soil, as I would use muck or lime. I made my basis for night soil of coal ashes, and they answered a very excellent purpose. I then applied the compost as a top-dressing to my low grass land, and although I do not think I derived much benefit directly from the ashes, yet, used in that way, they were of some value to me; but having muck in considerable quantity, I did not care to continue to use them for that purpose. Then I think coal ashes may operate mechanically on the soil, just as the oyster shells did that Dr. Durfee's gardener put into his grape borders. They helped the drainage of the borders, if they were likely to be too wet. So these coal ashes would act mechanically upon the soil in some instances, and might be of some use in that way; but I have yet to learn that they have any real value that will justify the time spent in working them.

Question. Would not sawdust have been just as valuable as coal ashes?

Mr. Hyde. I am not competent to say. I have always avoided the use of sawdust and all substances of that kind, because I know that insects and worms injurious to vegetation resort to them as a safe harbor, and they would be introduced into my soil if I applied such substances.

Dr. Durfee. I think we ought to say something about sawdust. I have seen a great many loads of it carted out of this city on to the farms to the east of us. It is used in the stables under the horses, and the stable-keepers sell it for manure.

Mr. Johnson. Can Dr. Nichols tell how much his corn cost per bushel this year? I understand him to say that he raised a hundred bushels to the acre.

Dr. Nichols. I keep a very accurate account of my crops. I keep a regular set of books, and give them all the attention that is necessary. I estimate that my corn costs me forty-five cents a bushel, and I do not include in that the value of the corn fodder. I estimate half the fertilizing material that I use in the field in the cost of the corn crop. I have raised corn for seven successive years at a cost of forty-five cents a bushel, and I do not see why it cannot be raised in Massachusetts at that

price. I do not raise it under the most favorable conditions, because I am not able to cultivate it myself; I am obliged to trust that to others and pay them for it. I am certain, it is a matter of demonstration, that my corn has cost me but forty-five cents a bushel. In raising corn, or in raising any crop (I am only repeating a truism that you will all agree to) we want to get the most out of a small piece of ground we can. There is the secret of profitable farming. If you get a hundred bushels of corn from an acre, of course you get it at much less cost than if that hundred bushels were produced from three or five acres. I have a field of ten acres, which I intend to plant with corn next year. I do not intend to apply to it a hoe in any form. I am going to see if corn cannot be raised without the application of a hoe, and without the application of any manure, except such as I shall provide, of the description which I have given here to-day. I think that I shall be able to show, as I have been showing, that corn is a profitable crop to raise in Massachusetts. I do not see any reason why we should not plant corn.

Allow me to say a word in relation to corn fodder. I believe our good friend, Dr. Loring, has been somewhat sharply criticised, in regard to his remarks about corn fodder. I think the doctor is partly right, and perhaps partly wrong. I have made some experiments, the past two or three years, and especially this year, with corn fodder, and I find that corn fodder sown broadcast is perfectly worthless. I demonstrated that practically by experiments upon my herd of cows, and I demonstrated it positively by an analysis of the plant. The results of my observations and researches, up to the present time, have been these: that in raising fodder corn, we must allow it to reach a certain point before we cut it. In the first place, we must sow it in drills; it must have access to sunlight and air, and it must be allowed to proceed to a certain stage,—and that stage is the formation of the ear,—before we begin to cut it. Corn fodder fed to animals before that period will not increase the milk; and if the corn is sown broadcast, you may take your cows from a very poor pasture and keep them upon that fodder, and they will fall off in the supply of milk. The practical deduction from this is, that we must sow our corn, the sweet variety, in drills, and not sow it too thick, and we must sow as many as

two or three crops, so as to have it come along in the hot season, in August and September, when our pastures begin to fail, and there is a period of three or four weeks when this can be used with very excellent results, as food for milch cows. I think the corn fodder resulting from a field of corn is of very great value for milk. I have found that my cows always felt the influence of corn fodder, and I esteem it very highly ; but in estimating the cost of my corn, I do not include that, I call that nothing, although I think so highly of it as food for milch cows.

I should like to hear the experience of some of the gentlemen present, in regard to the cost of raising corn. I do not see why we cannot raise all the corn we use in Massachusetts. It seems to me that we ought to raise it. It is certainly a profitable crop, or has been with me.

Mr. JOHNSON. I will explain why I asked the question. Our Middlesex South Society have, for several years, offered a premium for the best experiment in raising corn, and this year the president offered a premium of fifty dollars for the best experiment. The chairman of the committee last year stated that he did not think corn could be raised short of $1.50 a bushel, and the president of the society said he would give this premium of fifty dollars, for he wanted to know whether corn could be raised to a profit in Massachusetts or not. There were four competitors for the premium, myself among them, and we were of course obliged to keep an accurate account of the cost of the corn, and the committee were required to appoint some individual to superintend the harvesting, and weigh all the corn. Well, the corn varied in quantity, and of course in the cost. When the commitee met to examine the statements and award the premium, the chairman again said that it was his opinion, notwithstanding it was stated that some of the corn was raised at less than fifty cents a bushel, that there could not be a bushel of corn raised in Massachusetts under $1.50. He lives in the town of Southborough, and owns some of the most fertile land in the county of Worcester, and is a good farmer. His name is Peter Fay, and he is the man who sold the famous Peters farm to Mr. Peters. He has always been a farmer, and that was his opinion.

Now, I cannot state the figures in regard to the other experiments, but I can state my own. I raised ninety-three bushels

(fifty-six pounds to the bushel) of shelled corn to the acre. The corn was all weighed, and there were eighty-five baskets (seventy-two pounds to a basket) to the acre, which made ninety-three bushels, fifty-six pound to the bushel. I am not positive as to the cost, but I think it was forty-three cents and a fraction per bushel.

Mr. Moore. When was it weighed?

Mr. Johnson. Two weeks ago.

Mr. Moore. How much will it shrink before it is ready for market?

Mr. Johnson. I can't tell you. It will shrink considerably. But you will all be aware, that as the season has been, it must have been pretty well dried before it was cut up. I let it stand until I am satisfied that the corn was cured sufficient to crib and keep well, and the stubble also. It was husked and weighed before one of the selectmen of our town, and I kept close watch of the weight of the baskets, as he did, and there was not a basket that was not properly weighed. I was considerably excited during the whole time, for I knew what had been said, and I was watchful. I was glad to learn that the doctor had raised his corn at a price about corresponding to that. I hardly wanted to meet that corn committee, for fear they would think there must have been something wrong about that field of corn. Since I have been here, several farmers have estimated the cost of raising an acre of corn, and my friend from Upton, Mr. Knowlton, who has been a large corn raiser, estimated the cost at forty-two cents a bushel. In estimating the cost of my corn, I charged the crop with two-fifths of the cost of the manure,—fourteen cords to the acre,—and it left me a net profit of about eighty dollars to the acre.

Mr. Buffinton. What do you call the corn fodder worth?

Mr. Johnson. I call the tops worth three cents a bundle, which is the usual estimate. I do not consider them worth three cents a bundle, unless they are used as they are cut for the cows. I was unfortunate in the corn. (I may as well tell you the whole story.) I planted it the fifteenth day of May. It remained dry, and the corn did not come up well, and after the first hoeing I replanted, and got more fodder than I did corn.

One word about corn fodder. I am glad that has been spoken of. For three years I have planted my corn fodder early. I became satisfied that I got nothing for the corn fodder fed to my cows. I do not think I ever received a pound of milk for all I fed to them. But for three years, as I said, I have planted my fodder corn early, and let it stand until the ears began to form. The moment the ears begin to form, I begin to cut and feed to my cows, and I find that in this way I increase my milk. I was glad to hear that idea thrown out by the doctor. It corresponds, again, with my experience. I think it is science.

Adjourned to two o'clock, P. M.

Afternoon Session.

At the opening of the afternoon meeting, the chairman, Mr. Goodman, of Lenox, stated that the first subject for discussion was

FARM AND GARDEN VEGETABLES.

He then proceeded to open the discussion generally, as follows:—

There is probably no subject which is of more interest to the farmer, not only as a producer, but as a partaker of the good things of the earth, than this subject of garden and farm vegetables. We all know that "God made the country, and man made the town," and the first country that was made was fortunately a garden, and the first man, I am sorry to say, did as Charles Lamb said he would have done, "sinned himself out of it." And we find that that feeling has come down to the present day. There are a great many more people to-day who are willing to sin themselves out of farms and gardens, and rush to the cities, than there are people who are content to remain in the primeval paradise. Now, what we are trying to do as a Board of Agriculture, what the intelligent and cultivated men throughout the country, who are engaged in the pursuits of agriculture are endeavoring to do, is to restore this feeling; to make men believe that they can live as happily and pleasantly on their farms in the country, and fully as profitable, as they can live in the city. And this matter of profit is the one which strikes us most forcibly, in relation to the policy which we are to pursue in our farming operations.

It was a remark of Lord Bacon, that the scientific culture of gardens afforded a surer index of civilization than the advancement of any other science; and I apprehend that if we turn to the world's history, or review our own experience, we shall find, at least, that there is as much happiness in the cultivation of gardens as in any other employment; and the experience of gentlemen now in this room, when given to us, will show us that it is as profitable employment for the farmer, as any other branch of his business.

The cultivation of gardens is one of the oldest occupations in the world's history. Our friends in Utah, whose history was so eloquently given to us last night, were not the beginners in the great work of irrigation. They are merely followers of those ancient polygamists, in Babylon and other places in the East, who were celebrated for their hanging gardens; and our historians have shown us, that the system of irrigation, practised among the ancient Peruvians, whom we now know to have been as fully civilized as any people existing on the earth, was more complete, and attended with more difficulties,—the ruins yet attest the wonderful skill with which their designs in this matter of irrigation were carried out,—than the system which has been put in operation by those people, in the western part of our country.

In the Old World, the raising of vegetables has attained a greater height of perfection than in this country, and they are used there to a far greater extent as food than among us. There is no country in the world where meat is as cheap and plenty as with us, and where it is partaken of so freely; and I am compelled to say, that there is no country where that article of food could be so well dispensed with. The French people live mainly upon vegetables, as those who have lived among them know, and they have learned, not only to cultivate them thoroughly, but to cook them well, and to serve them up in such condition that they are palatable, and that they sustain nature; and you will find the people who partake of that kind of food as cheerful and able to do as much work as those who eat meat. It is a great folly to suppose that people cannot exist upon a vegetable diet, to a large extent. It is a great fallacy to suppose that we can do more work, exhibit a more cheerful disposition, or discharge our duties as citizens or as men better,

with a full meat diet than upon a mixed diet, the major part of which is composed of vegetables. We know that the people of the countries of the East are muscular, and perhaps exceed in strength, in agility, and in their powers of endurance, the people of the western countries; and yet those people live on a spare diet of cereals and vegetables.

Now, in this country it has always been one of the evils of our farming system, but slightly modified at the present time, that the diet of the farmer and his family has been mainly of meat, instead of being diversified with the fruits and vegetables of the garden. You may go now, even in this nineteenth century, and as late as the year 1871, among the farmers of this country, and you will find that most of them have three meals a day, which, in many places, are composed in great part of pork, in one form or another. Now, my private opinion is, that the devil entered into the swine about two thousand years ago, and has not entirely come out of them yet; that the effect of his presence is always felt, and once in a while it comes out very strong, in the shape of some mortal disease. There are occasions when men are driven to a diet they do not like. Dr. Kane tells us that when he was in the Arctic regions, with his sailors dying around him with the scurvy, he found nothing more palatable than a frozen rat; but we should not fancy that as an article of daily diet. I am not prepared to say that we should not eat meat at proper times, but I say that there is no occasion for having it before us habitually, especially pork. I have no doubt that any farmer will say that he can raise a two-year old steer just about as cheaply as he can raise a hog, and if he gets one of those into a barrel, he will have a better quality of meat; or, at any rate, he will diversify the food of his family; and if he adds the vegetables which ought to be grown in his garden, his family will improve in health and in morals.

This matter of vegetables for the garden and farm may be treated in various ways: as the æsthetics of the farm, so to speak, and as a profitable crop for the farmer to raise. We have improved a good deal in this matter of raising vegetables of late years, but too many of those farmers who raise vegetables are in the habit of sending most of them to market, reserving but a very small quantity for their own use. Look at the gar-

dens of our farmers, and what do you see? Take asparagus, for instance,—one of the most healthy esculents we have. If you see it at all, you will see it in a little bed about as big as a common door-mat, when it requires a space twelve feet wide by fifty or a hundred deep, in order to obtain a sufficient supply for a family. So it is with many of the most delicate vegetables, which farmers ought to have, but which, if they raise at all, they send the crop to market, and live themselves entirely upon potatoes and cabbage.

Now, in regard to raising vegetables for the market, we all know that it requires a peculiar soil to raise early vegetables, and that, as a general thing, it requires a different kind of labor from that which is ordinarily used on our farms. You can get a Yankee farmer to do almost anything, if you will allow him to do it with a horse or a pair of oxen, but when you invite him to come down and put his muscles behind a shovel or a spade, he is very apt to shrink from it. There are very few men who like to spade up a garden or to trench it, when they can take a pair of oxen or horses and plough it up; and that is one great reason why our farmers' gardens are not as they should be. In the first place, as Col. Waring emphatically told you, your garden must be thoroughly drained. You cannot raise good vegetables upon wet land, and especially deep-rooted vegetables. Your land must be thoroughly drained and ploughed deep, so that they can reach down as low as they want to go; and if the theory of the geologists and natural scientists is true, that the lower you go down the warmer the earth is, as the lower regions are only a few thousand miles below us, of course, the longer your roots are, the nearer they approach the everlasting fires, and the warmer they get. I suppose the theory of our friend, Mr. Greeley, about deep ploughing, is based upon that. However that may be, our gardens, as I said, must be thoroughly drained, and of course that must be by tiles. You cannot underdrain a garden by stone. You want your tile low enough, so that you can plough deep and get the soil in proper condition. The next question is, what kind of manure you shall use. If you are planting corn, you can use coarse manure, because a gross feeder like that will take up anything; but for delicate vegetables, those which you want to drive forward, so as to make them mature early,

that they may be fit for the table, or at any rate to get them out of the reach of the frost, you want to use manure so composted, and so comminuted, that the very moment the roots reach it, they can begin to feed upon it. As a general thing, the manure of our farmers is so coarse, so wet and so imperfectly composted, that it is worth but very little for this purpose. But I find that those farmers who are farming for milk or the production of beef, begin the first thing to make their compost heap. And every farmer can begin it with the materials at hand. He may make it from the leaves in the woods, from the muck-bed, from refuse manure, from anything that he can get hold of that can be put into a heap, which, by the aid of moisture, will decay. Any one who is in the habit of travelling about, will find that these theories are reduced thoroughly to practice by those people who come to this country from the old, where they have been in the habit of cultivating small portions of land at a great profit.

There is no country where cultivation has been so thorough as in Belgium. This has been due to several reasons, one of which is, the small portion of land which each farmer occupies, and their habits of systematic cultivation. You find the people from that country and other countries of Europe, on the line of railroad as you go to the city of New York, occupying what would be considered very sterile and waste land, but on which they raise the best vegetables brought into the New York market. In former years, Long Island was the great garden of New York; most of the vegetables supplied to the city were brought from that place. They were able to do it by the use of what came from the stables of New York, which was taken to the island in sloops, and there used in such a way, that the farmers of that place for many years carried on, and still carry on, a large and profitable business. I apprehend that their profits, if compared with those of any other class of men, almost, who are not doing business in the cities, would be found to be much larger. So it is now around Boston. You will find in all the suburbs of the city, that the men who are making the most money in farming or gardening, are those who are raising vegetables for the markets of that great emporium. Of course, we farmers away back in the country cannot expect to compete in that kind of business, but we may still find a

good profit in it. There is hardly a place in Massachusetts that has not a manufacturing town near enough to it to take a large portion of its vegetables; and there is one article, especially, which has a large sale for eating purposes, and that is the Swedish turnip. Our friend, Dr. Loring, has occasionally told us how good they are for horses; the people in our region have come to the conclusion that they are very good for men and women. We are selling them at fifty cents a bushel, and it does not take a great many to fill a bushel basket. Many of our farmers are cultivating them carefully, in the best possible manner, and producing very fine, nice and sound ones. They are nearly as hard as a brick, and I suppose will keep about as long.

Dr. Loring. They will keep longer.

Mr. Goodman. There is only one other point on which I wish to say a few words, and that is in regard to hedging gardens. Prof. Chadbourne knows as well as I do, that what chills us men and women, as well as our vegetables, is the west wind. We do not dread the east wind, as our Boston friends do,—we rather like it, because it gets a little tempered before it reaches the Berkshire hills; but the west wind comes from the prairies, it does not cross any water, and it is just about as fresh as our navigators find it at the North Pole, and unless we hedge our gardens, there are a great many things we cannot raise. I can raise the egg plant, for instance, to that point where it will blossom and the fruit begin to appear, but unless my garden is hedged, it will never come to perfection. I have a very simple way of doing that. I plant two or three rows of corn on the west side of my garden, quite thick, and let it grow, and then my egg plants, having the shelter of the corn, will grow to perfection. That is merely an illustration of the benefit of hedging. People who can afford to put a permanent hedge around their gardens, will find their fruit and vegetables much better and earlier, and they will have a great deal more comfort in working them.

Dr. Loring. The subject that you have opened is one of extreme importance, I grant, to man and beast; but it is one that I have discussed so often, that I crave the indulgence of the Board, while I go back a few steps and commence upon the preliminary chapter.

I trust you are not all wearied with the discussion of this morning upon the fertilization of the soil, because I want to present, as the commencement of vegetable growing, a few of my own ideas in regard to the preparation of the soil by means of fertilizers. I think you must all have been struck, not only with the difficulties that lie in the way of the scientific gentleman who addressed us with regard to the value of the application of commercial fertilizers, but with the different views entertained by practical farmers, who use every variety of fertilizer that they can lay their hands on. There was considerable disagreement, and nobody seemed exactly satisfied, or to have come to any definite conclusion. Dr. Nichols gave us an interesting account of the way in which he had brought up his farm in nine years, from comparative worthlessness to a condition of fertility that was admirable; but he did not go so far as to tell us exactly how he did it. And when he condemned the usual fertilizers found in the market, he did not state distinctly the means by which he himself has brought his farm up, nor the kind of fertilizer he used precisely. Notwithstanding the value of his lecture, we were left a little in the dark about that, and I felt when he got through that there was really no superphosphate that was useful for the purposes of cultivation. When we came down to the discussion among the practical farmers who were present, we were in the same difficulty. Nobody could tell us precisely what was the best method of fertilizing an acre of corn. The question was asked me here this afternoon, what the best manure to put upon potatoes was. So we were all left a little in the dark, a good deal afloat; I was, at any rate. And when Dr. Nichols said that we must accept fixed laws, those things that had been established, I had a mind to get up and say, "I will thank any gentlemen to show me what *is* fixed," for I am so hungry that I am ready to accept almost anything.

It seems to me, gentlemen, that the difficulty is this. This matter of fertilizers is one of the most intricate and complex with which we have to deal. Precisely what the soil wants nobody can tell, any more than we can tell precisely what an animal wants, in order that he may be developed to the highest point of perfection. We know he needs nourishing food, but what that is, we do not know exactly. I am satisfied that fer-

tilizers work in two ways: first, by directly feeding the plant, and, secondly, by putting the soil into such a condition that it can present to the plant, *from itself*, the food which it wants; in the latter case, working partly chemically and partly mechanically. I have no doubt about that. In the first class, I would put all those active manures that manifestly provide the soil with plant-food, as it is called, and at the head of this list I would put barnyard manure. You may go where you will, you may go to South Carolina, you may go to Germany, you may go to the Guano Islands, or you may go into any chemical laboratory in this country, the best thing, the last thing, and the fundamental thing, after all, is barnyard manure, and enough of it, to make a farm shine.

Now, it is a curious fact, that this barnyard manure answers both the purposes of which I have spoken. In the first place, it supplies the plant with food,—what we call the *pabulum:* what it is, I do not know. It is that which goes to make up bulk; that which, in a good slice of roast beef, goes to make a man feel full; and it is not nutritive, either. It is that which carries with it the fertilizing property, and makes a shovelful of fertilizing material a good deal better for the plant than a thimble-full. Now, I think that barnyard manure contains that in the best possible form in which you can put it, and that of itself, acting mechanically and somewhat chemically upon the soil, enables the plant to secure its food readily. Then it has another property. Dr. Nichols talked about nitrogenous manures this morning. They are the most stimulating manures we get, and while they act immediately upon the plant itself, they also act upon the soil in such a way as to compel a barren and impoverished soil to wake up and go about its business; so that those manures that are especially nitrogenous exhaust the soil. Exhaust it, why? Simply and solely because they compel the soil to work beyond its natural strength, so that the soil is exhausted after it has got through with that business. Hence there is a tradition somewhere, I forget where, that the farmers put fish manure upon their land until the land was worn out. It was the nitrogen that literally forced the soil into such a condition that when it got through, it was tired to death; it was like a man with an extra glass of rum. Give him the glass of rum and he will work like lightning; but when it is all

over, where is the man? That is the condition of any soil that is fertilized with nitrogenous manures. Barnyard manure contains that element, and that sets the land to work. Then barnyard manure has all those soluble salts, phosphates, nitrates, &c., which give food directly to the plant, and so it is at work all the time, doing in one mass what chemists and ingenious farmers are endeavoring to do by furnishing a substitute for each one of these active processes. It seems to me that that is the best illustration of the diverse ways in which manures act upon plants that I can possibly give you.

Then there is another fact with regard to fertilization which I think farmers should not overlook. I have said that your soils get exhausted; so they do, but I am perfectly sure, gentlemen, that the introduction of one soil to another may be made useful. For instance, if you have a bed of sand, you know perfectly well that you can increase the fertility of it by putting muck into that sand, if the muck is of good quality, and you know that you can improve the fertility of that soil by the introduction of clay. Every man knows that he can improve the fertility of his land by the mixture of one quality of soil with another, and it may be that the different qualities of soil are contained on the same farm, so that you can produce a good result from perfectly inert sand, when you mix with it soil of another character. Now, if we have on our own farms, lying side by side, diverse soils, which, if introduced to each other, will increase the fertility of our lands, that will help us a great deal. Everybody in Essex County knows that if he spreads two or three cartloads of sand upon his grass land it will make herdsgrass grow there as if he had sown barnyard manure upon the soil. That is one of the things that every practical farmer can test for himself, and I have no doubt that that will do a great deal towards the restoration of the old farms which we consider worn out. Every man who has a sand-hill and a clay-bed can try it, and you may depend upon it, that if the same industry and skill and one-quarter part of the money that are now spent in experimenting with manures, could be spent in the marrying of one kind of land to another—"and what God has joined let no man put asunder"—we should see results that would astonish us.

That seems to me the foundation of the whole business, and

that is a thing to which we can apply the law so well laid down by Prof. Chadbourne,—and somehow or other he seems to dig up about all the facts and laws that we can find: he hits the nail on the head every time, and that is a good thing to do. Now, bearing in mind the facts which I have stated, how admirably we may apply the law as laid down by him, that every man should study the process of fertilization on his own farm, and learn there what is best to be done! I have nothing to say of commercial fertilizers or superphosphates, because I have long since got weary of using them. I am told that there is fifteen per cent. of water in one, twenty-five per cent. in another, thirty per cent. in another, and so on. Well, I learned long since to respect water, for it seems to me to lie at the foundation of the whole animal, vegetable and mineral economy. You take these dry bones that have been so long idle, doing nothing, and how large a proportion of water do you suppose they contain, when you undertake to apply the test to them? Eighty-five per cent. of water in every man's brains—the best of them—a little more in some. Every particle of roast beef we eat—how large a percentage of water do you suppose we consume? So I have long since abandoned the attempt to find out the value of these fertilizers upon the water theory, and I use them just exactly as I use any substitute for the best thing I can find, and always try to get that which is the most reliable in the market. I know perfectly well, for instance, that ground bones,—I do not mean bones ground to powder; I do not think they are good for much, I may be mistaken, I am ready to learn on that point,—but bones crushed coarsely, and properly treated with ashes, as Dr. Durfee described this morning, make a useful manure. I have an impression that if the bones are ground to an almost impalpable powder, they do not act upon the soil to so good an advantage as bones that are more coarsely ground. I am not sure that the rains do not wash the powder away. It will not stay until the soil can get hold of it. Gentlemen are apt to forget that great chemical laboratory which Nature has established in the soil itself. I think that this impalpable powder gets out of the way before the soil can get hold of it, and therefore I think that ground bone is a better and more reliable thing, and, combined with ashes, I have no doubt it makes a very useful fertilizer. I think Peruvian guano

applied directly to the soil is a stimulant and a good thing to use. When all these things have gone through the chemist's laboratory, and have got into chemical combinations, I do not believe that even Dr. Nichols will undertake to vouch for them. These are the views I have in regard to fertilization.

With regard to the application of manures, I am perfectly sure that manure, when applied to the soil, should not only be properly composted,—which means combined with other and bulkier articles,—but that it should be properly decomposed. It has got to rot before the plant can touch it. Remember that. It is no use to talk about a plant growing upon the influence of green manure, for when the plant begins to grow upon the influence of that manure it is no longer green; it is thoroughly decomposed, so that the salts of that manure are fit to be taken up by the plant. While a cartload of barnyard manure is reduced in weight by the process of decomposition, it will be increased in the elements of fertility by the development of soluble salts in the process of decomposition. This has been proved over and over again by the best English chemists. It is therefore properly composting barnyard manures, or any other manures, with those articles in which your soil is deficient, which gives value to your manure; using sand as a compost for clay lands, and muck as a compost for sandy lands, and then letting the whole mass decompose before you expect the plants to take it up; for if you put it into the soil green, you have got to wait until the processes of fermentation and decomposition take place before the plant can derive any nutriment from it. I am sure if you will study the history of the best and largest crops that have been raised, you will find that they have been due to careful and accurate manipulation of the soil itself which produced the crop, and the application of carefully prepared and properly decomposed manure to the crop itself. That I think is the law.

Now I have one word to say as I go on—because I want to take these things in order—in explanation. We have heard a great deal said about fodder corn, and some people have been kind enough to look at me and say, "What a pity it is that you have committed yourself upon the wrong side of the fodder corn question." I have had more sympathy—I have had a great deal of abuse and a great deal of ridicule heaped upon

me, but I have had more sympathy expressed for me, in connection with this matter, than I ever had for any misfortune in my life, whether that misfortune was being stripped by a State Convention or anything else. I have never had gentlemen approach me in such a sympathetic way, as much as to say, "What a dreadful thing it is to have got into this position." Now, my friends, I have not got into the position that these gentlemen seem to suppose. I agree, I always have agreed precisely with what Dr. Nichols said this morning. When I stated to the farmers of Massachusetts that fodder corn was not a proper food to give to milch cows, I was dealing with what every farmer was feeding to his cows under the name of fodder corn. Now, friends, I used to raise fodder corn myself. Before I got too lazy to do it, I used to take a plough in the morning, furrow out my ground, take a small horse-cart and some manure, drop it into those furrows, and then I did just as the old, substantial, experienced farmers told me to do; I filled that drill full of corn. They told me that was raising fodder corn. Isn't that the way it is generally done? It used to be generally done so, and I believe it is generally done so to this day. That is the way fodder corn was and is raised. Now, what was my crop? It was just exactly the crop that every man gets who seeds for fodder corn in that way; and that was, along from the middle to the last of August a growth of vegetable matter from four to six feet high, without a shadow of a shade of maturity to it, as green as rowen, and that is green enough; as green as rowen, and as immature as a ten-year old boy; utterly without any indication of having arrived at a condition in which it would be nutritious to cattle. There it stood, with great leaves, great stalks, looking like I don't know what rampant growth. What did I do with it? Why, from the middle to the last of August, the hay-cart was sent out and it was cut down with a sickle or a scythe, piled into this cart, and brought up to the barn, put before the cows, and they ate it. I am telling you just exactly the way in which this fodder corn was raised and used when I came out and said it did not do any good. The cows got at it, and thrashed it this way and that, until they got thoroughly worn out. They would eat a good deal the first day, not so much the second day, and by the fifth or sixth day, they manifested that they had had about enough

of that. What was the consequence? The experienced farmers in Essex County found that there was no increase of milk, but a diminution. Mind you, I am not talking about *corn fodder*, I am talking about *fodder corn*. The milk was diminished, but of everything else other than milk and beef, there was an abundance. I said there must be some remedy for this. One of the most sensible farmers in my district came to me and said, "I have known just exactly this state of things for years; it is a perfect nuisance, just as you have found out for yourself; I thought you were green and had not found it out and I would not say anything about it." I thought I would turn round and see if I could not find a remedy. I tried millet, and I found that at the time when this fodder corn had reached the condition which I have described, my millet had come to a condition of maturity; it stood almost up to my armpits, a solid mass of vegetable matter with seed heads to it, and when I cut that down, I found that the effect of that article, which had arrived at that degree of perfection, was very different from the effect of the fodder corn. I found I could make milk with that just as well as I could with June grass; there was no doubt about it at all. I had got a plant there which, occupying the entire soil as it does, without any spaces between the rows, I am satisfied will yield as much food to the acre as fodder corn which is planted in rows. You see it occupies every square inch of the land, while the spaces between the rows of fodder corn are utterly useless. It seemed to me that I had got at something there that was useful. I fed my cows, and I got from two or three acres of land, food that would last my herd of fifty animals as long as my corn fodder would. I found no difficulty about it.

Then there came up this statement that I was all wrong. And what did those gentlemen who thought I was wrong, say? Why, they said, "Corn fodder is good food." So it is; but what is that commodity which we call "corn fodder"? In the first place, it is the stalks of corn; in the next place, it is the butts, usually so called. It is something that is matured, it is something that is left after the ears are taken from the stalks. That is corn fodder. That is what has been known from the earliest period down to the present day as corn fodder, and that is not what is usually called fodder corn in agriculture. If

anybody undertakes to say that corn fodder is not good for anything, he is mistaken. I agree that it is a most valuable article of food; that you can make as much milk from that, properly prepared, as you can from anything else—more than you can from poor hay. I am sure that our farmers suffer as much from the waste of their corn fodder as anything else. When I have been out in the country and seen those long stalks, as big round as your wrist, lying in barnyards, trodden under foot of cattle, and wasted there, I have looked upon it as one of the most wasteful things of which a New England farmer can be guilty, where winter food is as dear and scarce as it is with us. So I use all my corn fodder; cut it up and apply hot water to it, until it is in such a condition that my cattle will eat the whole of it,—the large butts, the leaves, and everything else. I think that corn fodder, combined with shorts and a little Indian meal, is about as good an article of food as you can give to a milch cow in winter time. That is what the advocates of fodder corn are talking about to-day, every one of them. Why, even the Commissioner of Agriculture, who has seen fit to come out with his manifesto in defence of something that he knows nothing about, saying that those farmers who undertake to reflect on corn fodder are ignorant, and do not know how to plant it, makes the statement that this food that I have just described is useful, and I agree with him that it is. If you propose to take an acre of land and plant this corn so sparsely that when it grows up, it will keep maturing, and along in the latter part of the season will have an ear upon it, and then cut it up and throw it to your cows, you cannot do a better thing. I agree to that; but it is then in the condition in which my millet is when I begin to feed it; it has reached the same point of maturity.

I dwell upon this, because, although it seems a trifling matter, it is a very important point for farmers to understand who wish to conform themselves to the best law of vegetable economy in feeding their animals; and it is not a trifling question, in that point of view, at all. I agree that the plant which I have described, brought to that degree of maturity which I have described, is a most valuable and useful thing. I have used it this summer myself. I raised six acres of sweet corn this summer; it brings us from $150 to $200 an acre, in the market

close by where my farm is. Of course there were some nubby and imperfect ears left, not suitable for the market, and I looked upon that six acres as something that I could feed in the winter time. I said to myself, "This will extend my hay crop; I have got something here to feed to my cows;" but my pastures got short, my mowing fields were not in a good condition to feed, and I had to go at this standing corn. I had to cut this sweet corn, standing there, and it did just what I supposed it would; it increased the flow of milk from my cows, and was a useful food to give them. Why? Because it had arrived at a degree of maturity in which the plant could nourish the animal and increase the flow of milk, and that I go for; with this exception, that I cannot afford to raise anything on my farm to consume in the summer time which I can pack away in the barn to feed my cows on in the winter. That is a fact. I am so sensitive on that point, that I will not allow my farmer, or any other person in my barn, to feed a lock of English hay to anything except to the horses that have been driven on the road. If a yoke of oxen cannot do my work and get their feed in the pastures, I do not want to have them around, and I am sure I do not want to feed any animal with that kind of provender which I can store in my barn to use for winter food.

Now, I think I have explained myself fully. *Corn fodder* I believe in; I will go with the rankest corn fodder man clear through to the bitter end. I have committed myself to that point, haven't I? But *fodder corn* I despise and repudiate, as usually known in the catalogue of green food for cattle. I might, perhaps, if I could take my pen and write it all down, explain myself still further, but I cannot do it now. I put it exactly on the same principle that I put the hay question; that is, it is a question of economy to the farmer and a question of nutrition to the animal at the same time.

Now, in regard to vegetables, just one word. I agree with all that Mr. Goodman has said. I agree with what he has said in respect to the profits of raising vegetables. It requires nice farming, careful agriculture, the proper application of manures, the proper mixing of soils, the most economical use of fertilizers, the utmost care and watchfulness, to raise any kind of vegetables for the market. It takes just as much vigor, activity and skill to run what we usually call a market garden, as it does to run

one of the cotton mills in Fall River, and I do not know but more, because, when Edmund Burke said it required more judgment to make a man a good farmer than it did to make him good in any other calling in life, he spoke the exact truth, and no man can deny it.

Now, what Mr. Goodman said about the use of a vegetable diet, I do not want to be forgotten. It is so important a question, that the Board of Health of the State of Massachusetts are appealing to me continually to write an article for them to put into their next report with regard to the value of vegetables. I look upon them as almost indispensable here. I look upon the use of salt meat as lying at the foundation of a great deal of the disease from which we are suffering in the eastern section of the United States, and in some other sections. I am sure there is nothing in the world so tough as a well-fed man. You cannot hurt him any more than you can a fox. You may take him to the North Pole, and he will live year in and year out on walrus or blubber, or anything else; you may start him on the dead run, and if he brings up at the equator, he is just as much at home in his linen blouse as he was in his furs. All he wants is a good stomach. A healthy digestion will carry him through all the perils of life, social, civil, or whatever they may be. It is a most remarkable fact in the history of nations, that those peoples who are fed upon a proper admixture of animal food and vegetable food are the most robust. The climate of Holland is not desirable: it is low, humid, damp, cold and disagreeable to a very considerable extent; it is no better than the climate of Massachusetts; and yet the Hollanders, living as they do largely on a vegetable diet, are hardy, tough, fat and round, and have a good time generally. They look as if they meant to enjoy themselves, and I have no doubt they do, and you can attribute to their vegetable diet a large portion of their physical condition. I hope that will be remembered. Now, I desire to say, that so far as the health of this community is concerned, if the farmers of the country are too busy to take up the raising of vegetables themselves, I hope they will put in a petition to the next Woman's Rights Convention, held in New England, and ask the women if they won't be kind enough to turn their attention to the cultivation of vegetables, and if they will only take up that as their part of the business of life, I don't care

what they do next. They may vote,—if they will vote for the right man,—or they may do anything they please. I say it in all soberness. It is a most admirable work for them to enter upon.

In regard to the profit of raising vegetables, there is no question. Where do the vegetables come from that are consumed here in Fall River? Where do the vegetables come from that are consumed in the good towns of Essex County? Do they come from the adjoining land? No. Strange as it may seem, we are living in our towns and cities upon the refuse vegetables of the Boston market. I have known barrel after barrel of green pease to start from the town of Weymouth, go into Boston, be sold there, and then be consumed in the town of Taunton. Those pease made two journeys over the same road. That is a most extraordinary fact. They went to Boston first, and they went to Taunton to find a consumer. That ought not to be so. The profits that have fallen into the hands of those men who supply the Boston market with provisions are enormous. They are almost as rich as the Fall River mill-owners, and that is about as much as can be said in this Commonwealth.

Now, what applies to the region about Boston, applies to the region about Worcester, Lawrence, Lowell, Springfield and every other large city or town of this Commonwealth. There is not a single acre of land within four miles of those towns to which I have alluded, that could not be made, by a proper application of skill and industry, profitable to the owner for the purpose of vegetable growing.

Dr. Durfee says I have used up my time; I am afraid I have used up your patience as well, and I must leave for the train.

The Chairman. I disagree with the doctor totally upon the corn-fodder question. He states distinctly what he means by corn fodder: that is, what the farmers in our region, and through the whole of Western Massachusetts call "corn fodder," he calls "fodder corn," and there is not a farmer from Western Massachusetts here to-day who will not say that he has fed out his fodder corn this year with great profit, and that if he had not had this fodder corn, he could not have carried his cows through. I appeal to my friend here from Barre (Mr. Ellsworth) and to any gentlemen from that region, who keeps a dairy, to say if he has not used fodder corn this season to great

advantage. The question is not whether fodder corn is the best food. You have got to draw the same distinction in this case, that should be drawn in regard to barnyard manure. We all agree that that is the best manure in the world; but suppose you have not got it, then you must come down to the next best. So it is with corn fodder. If you have plenty of pasturage, you do not want this fodder corn, because it is poor stuff; it is hard to grow and difficult to keep, and when it is made, it is not half so good as grass, when put into the barn for winter; but the great question now is,—take a region like Western Massachusetts, where our pastures grow dry almost every season, where they are apt to fail by the first of September, and where, the last two seasons, they failed about the first of August,—what are we to do? Why, do what I have done for some years, raise what is called fodder corn, and raise it in the best possible way. Dr. Nichols has told us, and the Commissioner of Agriculture at Washington has told us this year, after gathering the facts from farmers all over the country, that the best way to cultivate this fodder corn is to plant it in drills, so that it will be exposed to the air and the sun, and get more mature, and do a great deal better than when it is sown broadcast. I have sown it for two years so thick that no weeds could come up. My pastures were entirely dried up, this year, and for at least six weeks fodder corn was all my cows had to support them, and I did not see that the profits from the milk were reduced from what they had been when the cows were in the pasture.

Mr. Buffinton. Did it spindle before you fed it out?

The Chairman. Yes, sir. I got the Western corn. It was sown broadcast, as thick as it could be, and it grew at least four feet high. That is the stuff which is designated as "fodder corn," which we call "corn fodder"; because what the farmers in my section call corn fodder is corn stalks after the corn has been taken from them.

Now, there must be some virtue in this corn. It is perfectly idle for any man to say that you can sow a kernel of corn, and that the blade which comes up from that is worthless. You might just as well say that you may sow a grass seed and the blade of timothy that springs from it is not good for anything. I have sown Hungarian grass, but it requires more care, and I

cannot get my men to go into it as I want them to. But I apprehend that there is some virtue in this fodder corn, if we cannot get anything better. I think I first started the using of this corn in the southern part of Berkshire County. Until within the last few years, there were but five entries of this corn in our society; the past year, there were sixty entries. Those gentlemen here who know the Berkshire farmers know that they are men of intelligence and experience; that they are as good farmers as can be found in a mountainous country. They are men who know what they are about; they farm for a profit; and do you suppose there are sixty farmers there who devote from one to two acres every year to raising this fodder corn, knowing it to be entirely worthless? The doctor may be right; I am very glad he has given us this explanation; but he stands firmly to-day upon the ground that this kind of corn is worthless. It may be so down in his region; there may be some peculiarity in the atmosphere, or in the animals by which the assimilation of this food is of no benefit to them; but in the western part of this State, that is the only substitute we have for our pastures. It seems to me that we should just as soon cry down the raising of grass in our pastures as to cry down the raising of this fodder corn, until we find something to take its place.

Mr. Ward, of Shrewsbury. I think there is no great difference between Mr. Goodman and Dr. Loring. If I understand the doctor, he does not condemn the use of fodder corn. He acknowledges that it made everything but milk. When he went to his millet, and let that mature, then he made milk. Now, I believe Mr. Goodman in his remarks acknowledged the same fact,—that there was life-sustaining matter in the fodder corn, but he did not say that he increased his milk.

Mr. Goodman. No, sir; but I say I made the same amount of butter.

Mr. Ward. Milk is Dr. Loring's object; and it is the object of most farmers. It is the desire of most farmers to use that kind of fodder that will make the most milk, and I do not conceive that there is that extreme difference between the statements of the two gentlemen that some might perhaps infer. I believe they will come to the same point in the end.

Mr. Hyde. I am sorry that any gentleman has found it necessary to take up three-quarters of an hour in explaining his position upon the question of the use of fodder corn. I think we have heard enough about this matter of fodder corn, especially when we have another subject assigned in the programme, in which we all have an interest. I do not object to the entertainment which the doctor has furnished; some parts of it were very amusing, and amusement is sometimes necessary and useful, but I am of opinion that we ought to discuss this question of market gardening. It seems to me that no more important question could be discussed at a meeting like this. It certainly ought to be a subject of interest to this city, if it is not to any other part of the State, but I think it is interesting to all our cities, and the neighborhoods about cities. I do not blame you Mr. Chairman,—you could not very well help yourself that the discussion took this direction,—but I regret that it has.

I do not wish to take up much of your time on this question; I was in hopes to hear from my friend, Mr. Moore, and others who are practical men, and who are raising vegetables for the market; but while up I will say a very few words.

You are aware, as every one is, that within the last few years the standard of market gardening has advanced about our cities, especially about Boston, and I believe from my observation in the principal large cities in the northern part of the United States, that there is no market so well supplied with good vegetables as the Boston market, and I believe I might go further and say that in certain things it is unsurpassed on this continent; among these are cauliflower, lettuce and celery, and I might add, strawberries, but these come more properly under the head of Fruit Culture. I say the standard has been greatly elevated. How? Through the instrumentality of horticultural and agricultural exhibitions. I can remember that only a few years ago a great many vegetables were brought to our Massachusetts Horticultural Exhibition, that we were ashamed to have exhibited; still it was hard to refuse contributors who had taken the trouble to bring them in, perhaps some distance; but finally the committee said "No, we must raise the standard; our room is limited, and we must have none but the best." The result is, that we now have exhibitions such as I have

never seen anywhere else except at Concord, and possibly at Dedham. They have done the same thing there, they have excluded the coarse vegetables, except it may be mangolds, where bulk is sought rather than fine shape and quality; these exhibitions, and others that I might mention, have been made better, the public have been educated up to a higher standard, and they have come to know what a first-rate vegetable is; and that is just the object which, as it seems to me, should be sought by these exhibitions; and what we want to talk about to-day is the best method of raising superior vegetables.

Now I endorse all that has been said in regard to a vegetable diet. I do not want to give up my roast beef; I like those things just as well as the others; but I do like vegetables. You may laugh when I talk about the flavor of vegetables, as I do about the flavor of fruit, but you know we fruit-growers cultivate this matter of taste, and some of us think we are quite acute in the matter. I sometimes taste twelve or fifteen varieties of grapes, and taste apples and pears in the same way. There is just as much difference in the flavor of different kinds of apples or pears, as there is in their looks. Just so it is with vegetables—the cabbage or the turnip—and I don't know why we should not carry this same thing into vegetables, to see whether they are the best of the kind that can be raised. To illustrate what I mean: Here is a man who sets out his celery in early summer, and earths it up as he finds it convenient, without regard to the season whether it is wet or dry; and when he comes to dig his celery it is rusty, wormy, thin and poor. You go to Mr. Crosby, of Arlington, or some other good grower of celery, who does not treat his celery in that way; and which would you take? You would not hesitate long to take that which was tender, crisp, delicious and free from all those imperfections of which I have spoken. What makes the difference? One man knows his business and the other does not. One gets a good article, and the other does not.

You may carry this all through. One man wants to raise cauliflower. He goes into a seed store and buys cheap seed; pays five cents a paper for it; he could not get a decent cauliflower if he bought a pound. Another man goes in and asks, "Have you cauliflower seed? I don't care about the price, if it is five cents a seed, if it is only good." What is the difference?

This man gets a magnificent white head of cauliflower, ten, twelve or fifteen inches across. I am not exaggerating this; I am telling you what I have done myself, and what others have done a great deal better than I have, for I do not claim to be a grower of vegetables; I only grow enough of such as will grow in this climate for my family. That is what I mean. I say that you can carry that principle all the way through. To illustrate further: there are men here who are very particular about their animals. If I should show them a good Jersey animal they would say "Where is his pedigree?" and if I said, "I cannot show you his pedigree, but I can assure you he is a very good animal," they would say, "We don't want that animal at any price;" but you buy your seed without regard to its quality; you put that seed into the ground in any way you can; you are not particular how the garden is ploughed up, and yet expect to get a good crop of turnips or cabbages or beets; that is not the way to do this work; if it is worth doing at all it is worth doing well.

Now certain gardeners about Boston have acquired a reputation for certain things. I can tell just as well who will have certain articles first-rate, as a butter dealer can tell who makes good butter up in Western Massachusetts or in New York, and who will make it good every year. I will tell you where you can always get a first-rate article of lettuce or cauliflower or celery every time, and they will never fail. Why? Partly, perhaps, because they had made a specialty of these things, but mainly because they knew their business. They know what a good thing is to begin with.

Now do not find any fault with me, for I do not mean any particular agricultural exhibition, but I have seen crowds of vegetables in various agricultural exhibitions that never ought to have been there. In the first place, it misleads the public. They think those vegetables good when they are not good, and they ought not to be admitted. The exhibitors ought to be told to raise better vegetables, and then they will be shown. It is a good deal as it was up at Amherst last fall. Some men came to Colonel Clarke and said, "We have entered for this horse race, but here is a man who has got a horse that will distance all our horses, and take all the money." "Well," said the colonel, "Let him do it if he can. I am glad of it if he can

distance all your horses; go and get better horses." Now I say exclude those vegetables, and tell the people who bring them that they must raise better. Do you say that cannot be done? I say it can be done; it only requires men who understand their business. It is hard to raise all these things to perfection. I grant that it is a hard and difficult thing to run a farm successfully. I said at table to-day, that it used to be believed that a farmer could take his smart boys and make ministers, lawyers and doctors of them, and make farmers of the boys that were left—make farmers of the fools. The fact is, you want the smartest boys to make farmers; if a man does not know his business he cannot succeed.

Dr. Nichols told us that the farmer could make this manure that he recommended. I do not see how. It is easy for him to make it, but could a man take hold of it and learn as he could. Now we can do this thing. My business takes me to almost every part of the State, and I have noticed, as I have gone around, how many farmers there are who feed themselves and their families with pork and various other articles of food that are not among the most healthful, and upon whose tables I have rarely found any other vegetables than a potato, and possibly a cabbage, when there are at least twenty varieties of vegetables, some of them most delicious, which can be raised just as well as a potato or a cabbage. The wonder to me is, that you scarcely find a garden, go right through Massachusetts, that has asparagus, that has cauliflower, that has celery, that has the egg-plant, and so I might go on and enumerate vegetable after vegetable that you rarely find in a farmer's garden. If they are a luxury, why shouldn't we have them for our own use, to say nothing about raising them for market. Just look at the matter of cauliflower. I grant they are a little capricious, but look at it; I sell my surplus for from twenty-five to fifty cents a head. They will yield about as well as cabbages; they will not all head as well as cabbages; but suppose half of them head, what a crop it is. There is no more delicious vegetable than the cauliflower. Do you ask if there is a demand for them? The public cannot get enough of them. These are all within our reach, even if we do not want to grow them for profit, but I take it farmers, like other men, want to make all the money they fairly and honestly can. Some of us

farm for pleasure, but most of us farm for profit. We are talking about gardening for profit. Now where can you make the most money? I do not believe you can make it in raising ruta-bagas; they are very heavy to carry to market, especially if you happen to be twenty miles from a market, but you can make thousands of dollars in raising asparagus, and you can send it just as well twenty, thirty or fifty miles, as you can send it four miles. It may be that the middle men get rather more than they ought, but that is one thing; it is not heavy to cart, and it always sells. I never knew the market glutted with asparagus. Mr. Moore raises the best that is raised in Massachusetts. I never knew the market fully supplied with cauliflower or asparagus. I never knew it glutted with celery, and so it is with lettuce. Do you know that Boston supplies the lettuce and celery for the markets of New York and Philadelphia, to considerable extent? It is true; in my own town of Newton, hundreds of dollars worth of lettuce are sent to New York every spring. It seems very strange that they cannot get lettuce there. It can be raised anywhere where they will attend to it. One hundred dollars worth of it will not weigh as much as five barrels of ruta-bagas that you would not get more than $15 or $20 for. Now you can raise lettuce out of doors and in doors. I speak of these things merely by way of illustration. This is a subject which I could talk about a great while, but it was not my intention to speak at any length. I wanted simply to throw out these hints to provoke some discussion. I want to hear from others who I know are well qualified to speak on this subject.

Mr. Stone. I am not going to make a speech: we have some gentlemen here, Mr. Moore and Mr. Slade, and others who know all about this subject that is now before us. If we can get our friend Moore at it, I think he will give us something that will please us; and if there are any gentlemen here who have attended the Concord show, and seen the display of vegetables in that hall raised in and about Concord, Arlington, &c., coming from those very market gardens that beat the world, my friend Moore would need no further introduction than to say that he is one of the men who does it. I hope he will tell us how it is done; and I hope we shall hear from our friend Slade, who lives in this immediate vicinity, and who

is a very successful cultivator of strawberries and vegetables, and who finds his market in Boston. I want him to tell us why he is obliged to send his vegetables to Boston.

There is another thing I want to bring to the notice of this meeting, and that is, an essay that is published in the Massachusetts Agricultural Report of the present year, on market gardening, by the very gentleman whom I am endeavoring to call up, Mr. Moore. A more valuable essay, according to my idea, was never written and printed in this or any other State, if gentlemen will only examine it and learn from it.

Dr. DURFEE. If I were from Middlesex, I think I should stand up here pretty bold on this subject. I have been dwelling considerably of late upon statistical information, and when I came to look over the statistics of Massachusetts, and saw what Middlesex does in this matter of raising vegetables, and the annual income received from that source, it astonished me; and, as I said before, if I was from that county, I think I should be ready to say something in regard to the position of Middlesex on this subject. I notice in the statistics of the Industry of Massachusetts, that Middlesex County received more income from the growing of vegetables than the whole State of Massachusetts besides, and any man who comes from a county that has as good ground to stand on as that, certainly ought to be heard on this floor.

Mr. MOORE, of Concord. I do not propose to say anything on the corn-fodder question, but I could not help thinking, at the time when that matter was under discussion, that a gentleman who is as smart as Dr. Loring must have been in a pretty tight place, if it took him an hour to get out of it. I leave it there. I think that is answer enough to all he has said.

I do not know that I need to speak of the importance of raising vegetables for consumption by the human race, or for consumption by cattle; certainly not, as far as the human race is concerned; but I do not think that our farmers understand the necessity of growing roots for their cattle. If they do understand it, they do not do it. There is no doubt that the feeding of roots makes cattle more healthy, and they are probably cheap food. In raising vegetables for the market, there is a necessity that the soil should be adapted for growing

vegetables. If you propose to raise a handsome crop of carrots, parsnips, or any other long-rooted vegetable, it cannot be done on clay soil; it must be done on sandy loam, or soil of that nature; while cabbages and cauliflowers would grow better on clay soils. The first thing in growing vegetables is the preparation of the soil; that is a very important matter. In the first place, the soil must be deep; it must be well drained, and it must be so thoroughly harrowed and stirred as to reduce it to a fine tilth, otherwise you cannot raise smooth roots; it is impossible, with lumps in the ground, to raise smooth roots. Then it must also have high manuring. Farmers are not aware what market gardeners mean by high manuring. A friend of mine, who is a market gardener, who cultivates only ten acres of land, uses two hundred and fifty cords on that ten acres. Of course some of it goes into his hot-beds; but that would frighten an ordinary farmer. I do not know where to get so much manure as that; I get all I can, and make it go as far as I can.

To grow vegetables as they grow them in the vicinity of Boston, you must have an abundance of manure. Not chemical manure; I doubt if you could grow vegetables with any of the preparations that Dr. Nichols could give you. I should not dare to try it, with any of them. Although I have dissolved a great deal of bone in sulphuric acid, and formed what I called superphosphate, and found a good effect from it, yet I have only used that in addition to the other fertilizers.

After the preparation of the ground, and having the soil highly manured, then you come to the seed. Now, farmers do not understand that matter as market gardeners understand it. The difference between good seed and bad seed is the difference of all their profits. No one who uses poor seed can raise good vegetables. As friend Hyde says, good seed is of the first importance; without it, you cannot raise good vegetables. In the growing of vegetables as food for cattle, a little coarseness might be allowed, because, as friend Hyde says, bulk is of more importance than smoothness; but in raising vegetables for the market, it is necessary that the seed shall be of those varieties that will grow a smooth root. Much of the cauliflower seed that is sold is worse than worthless, for if you manage to get plants above ground, and have a poor crop, that

is worse than if they did not grow at all, for then you would try some other crop. Take turnip-beet seed, to illustrate. Suppose a farmer sows an acre of turnip-beets, the product of that acre should be six hundred bushels, to say the least. That would not be a large crop. Now, if he raises a good article, take one year with another, they will bring nearly $1 a bushel in Boston market; but if they are a coarse article, that market has become so particular, that the dealers will not take a coarse article, and it is no use to send it there. If it is a coarse article, it is worth what? Anywhere from fifteen to twenty cents a bushel, as food for cattle. There is the difference between good seed and poor. You can all see it at once.

After the seed is sown—and, by the way, what Dr. Nichols said to-day is true, a large portion of the seed is planted too deep—the market gardeners use a small hand-roller a great deal in their business, because you can sow your seed at a less depth, and it is more sure to germinate if the soil is compacted by running a hand-roller over it after sowing, and it will come up much better. In sowing their seed, market gardeners are very careful—and the same would apply to a great many farm products—to have their rows perfectly straight and of uniform width. I contend that it is no more work to raise beans or anything else in straight rows than to have them crooked, and you do not annoy anybody, or make anybody twist his head off in looking across your field. Why is it better to have the rows straight? For the reason that you can run your horse-cultivator and your wheel-hoes much nearer to the row when it is straight than when it is crooked; therefore, you save in your cultivation. Then, if you wish to cultivate in the best way, you will cultivate early and often; the old democratic way of voting, when I was a boy. Keep all the weeds down; don't allow them to get a start. The old idea of letting the weeds get up and then killing them is exploded; market gardeners don't believe in it. We don't propose to have them get up at all. Thorough cultivation improves the crop, makes it larger, makes it less costly, not only because it is larger, but because it is less work. Therefore, clean and thorough cultivation is one of the most important things in raising garden vegetables; but no more important there than it is in growing crops upon the farm. No farmer can afford to raise a crop of

weeds. Most farmers do it, but they cannot afford it. I have raised about as good a crop of weeds, I presume, as any one in this room, and I think it was the most unprofitable crop I ever grew. There are a great many objections to raising weeds. One is, you exhaust the soil, to some extent. Another is, if you don't cut them off before they have gone to seed, you will fill the land full of seed, which it will take years to get rid of, if any of it is ploughed in very deep. Take Roman wormwood, for example, which will not germinate if it is two inches below the surface. You cannot reach it, therefore, all at once, and you will be troubled a great while for a little neglect in allowing the weeds to grow.

All farmers should endeavor to make some improvement in their vegetables. It is a very easy matter, I think, to improve your varieties by cross fertilization. Take any variety of field corn, and I have no doubt that inside of five years I could improve the productiveness and earliness of that variety from ten to twenty per cent. You see the point. If that is true, and it could be done throughout the State, you see what an addition it would be to the corn crop, simply from having good seed. Now, if you cross the seed of any varieties, and get what you want, the tendency of that seed will be to revert back to one of the original parents; perhaps the one you want least. I might illustrate that by taking corn. Suppose you have a very early variety of corn. Earliness is usually associated with fulness of size, and small corn is not usually so productive as large. You want to retain that earliness, and at the same time increase the size, and you cross that with a larger variety. Well, after you have got what you want, then will come your trouble, to some extent. You will want to save the seed, and the most natural thing for a farmer to do is to save the largest ears that grow on his field, and it is just those ears in which the tendency to run back to the original parent, which was late, is most strongly developed. If you plant the seed from the largest ears that are produced on your field for three or four years, you will very nearly run that corn back to the original late parent; whereas, if you select just the ear you want, at the time it is maturing, so as always to get size and earliness, you will perpetuate the desirable variety, to a considerable extent.

Now, in regard to specialties in farming,—specialties in raising different crops. Every farmer here can probably think of some person in his own town who is very successful in raising potatoes, as an illustration. The first thing a farmer would say is, "That man has a better soil on which to raise potatoes than his neighbors"; but you will find, if you look carefully, it is no such thing. Perhaps that man has gone into raising potatoes largely, and it becomes a matter of vital importance to him to know how to do it in the best way; therefore, the first thing he does is to look up that matter. It is his trade to raise potatoes, and he perfects himself in that business. Other farmers assume that it is all owing to his soil, but it is not so; he knows how to grow them; knows how to prepare the soil and the seed. I have experimented with potatoes, although I do not raise them much for market, for it pays me better to do something else, and I know I can raise a good crop of potatoes at any time if I will comply with certain conditions. That is, I know that if I take a piece of grass ground, and let it run until the middle of May, until the grass has got a good start (mind you, these would not be early potatoes), then put on a heavy dressing of coarse manure, and plough it in four or five inches,—four would be better than five,—I have got the conditions requisite for a good crop. What have I done? I have done just what has been recommended here. I have composted that manure completely. I have turned it over with the grass sod next to it, and piled four or five inches of earth on top of it. I have a soil under it, which saves any gases that might otherwise be lost; I have a soil above it; I have that sod lying there within five inches of the surface. What have I got? Why, gentlemen, you will see at once, that I have made a perfect seed-bed to grow those tubers in. Now, after turning that over, the sod not being ploughed under very deep, you see it would become necessary to roll that ground to prevent the harrow from pulling up the sod. I do not want the sod in my way. I roll it down, harrow it, or work it over with the cultivator or something of that kind. Then I furrow it, and I have used, in addition to the manure, superphosphate in the hill.

You may talk about the necessity of potash for potatoes. I am not going to dispute about that. But almost all soils in Massachusetts, even the most sterile, have more or less potash

locked up in them, and the effect of that nitrogenous manure which I have applied is to liberate that potash, to make more potash available to the plant.

Now, I know that as large potatoes as I ever saw grown have been grown by myself, three or four years in succession, in just that way, whereas, in some other ways, perhaps I should not have got so large a crop. Of course, I am not prepared to tell you how many bushels I raised to the acre, but as many as has been mentioned here to-day, to say the least.

The only other matter of which I shall speak, for I do not want to take up too much of your time, is the necessity of fighting insects at once. In market gardening, you must not give them any chance. If any insects appear, you must contrive some way to fight them. The insect that perhaps annoys me more than any other in the growing of cabbage is a little maggot that works under ground. Perhaps you will find twenty or thirty on the stem of a cabbage. That insect troubles the Arlington gardeners a great deal, but they protect themselves in some measure by high manuring. One of my friends said, "If the maggots don't eat up my cabbages in two days, I will drive them up so big that they can't hurt them." That is the whole secret of this matter, if there is any secret about it.

Mr. Ward. Do you find any objectionable quality in potatoes raised in the manner you have suggested?

Mr. Moore. No, sir. I don't believe in a good deal of the talk that we hear about tasting the manure in all the stuff that is grown. If that was true, you would have a pretty strong taste of manure in the vegetables grown around Boston.

Question. How deep do you put your seed?

Mr. Moore. I cover them sufficiently to have them germinate—two or three inches.

Mr. Johnson. As no one else seems to be inclined to say a word, and as I belong to that good old county that Dr. Durfee has spoken about to-day, and always feel proud to claim that as my birthplace,—more so, I have no doubt, than the county feels to claim me,—I will say, that we claim to stand at the head of all the other counties of the State in regard to vegetable gardening, and almost all other products. We have heard from Capt. Moore, who has the *science* of growing vegetables of all kinds, as well as fruits, that the secret of growing them successfully is

in the preparation of the soil. The same thing is true with respect to the growing of farm products. Then the next thing is the manure; and I am very much obliged to my friend Moore for referring to it, for it reminds me that I should have stated more particularly yesterday, when speaking of my crop of corn, in regard to the manure, that it may be understood how I got over ninety-three bushels to the acre. It is in the preparation of the soil, to begin with; it is in the preparation of the manure in the second place, and in the care of the crop in the third place. In regard to the preparation of the manure, I should say that potatoes, or any other seed, will grow a great deal better in manure that is thoroughly decomposed, not burned, than in green manure. It should be thoroughly decomposed and made so fine that as soon as the corn or the vegetable starts, the roots may take hold of that manure; and it is very essential that there should be manure enough upon the ground to carry the crop through the season. That I suspect is the whole secret of raising large crops.

While I am up, I will say, that I have been to Capt. Moore's farm, and seen the care and skill with which he conducts his business. Everything is in its time with him, and everything in its place. The captain has made an admirable appearance here to-day, but if you want to see Capt. Moore in his glory, you must go to old Concord, and see him on his farm.

Col. Stone. There is one point which I had hoped to have heard discussed here to-day which has not been referred to. I allude to the great importance of a rotation of crops in farming, and in market gardening also. We have a gentleman here who, if he sees fit, can discuss that question ably. Perhaps most of you had the pleasure of listening to him, some years ago, when he gave an admirable lecture on the subject. I refer to our worthy Secretary. I believe the time is coming when that point will be regarded as one of great importance. When we have settled these minor points, we shall learn, that in order to get the whole profit of the manure, the whole virtue of the soil, a rotation or succession of crops is necessary.

Now, gentlemen, I am not a market gardener; I am not what you would call a farmer. My department has been mostly the nursery, a department which does not properly come in here; but in the prosecution of the nursery business, (I think my

friend Hyde will bear me out in what I say), I have witnessed most extraordinary effects follow the carrying out of this principle of the rotation of crops. To illustrate the point I wish to come at, and which I wish to enforce upon your notice, I will say that in the preparation of the ground for apple-trees, for instance,—for we cannot grow pear-trees successfully in my immediate neighborhood,—we are obliged to prepare it very nicely, in order to be successful; as nicely as my friend Moore would prepare it for his vineyard or for garden vegetables. We plough deep, manure thoroughly, and then, in setting out the small plants, the seedling apples, we calculate that the ground is in a fit condition to carry those trees almost to their maturity. Now you will see that the growing of a crop of apple-trees successfully, which requires three or four, and sometimes five years, exhausts the soil of all its ingredients which the apple-tree calls for, or perhaps any deciduous tree calls for. A nurseryman who understands his business knows that it would be folly for him, after he has taken off that first crop to attempt to put a second crop upon that land, even if he manured equally as well as he did the first time, because his crop has exhausted the soil of certain things which are peculiarly necessary, and which can only be found in newer soil. My practice has been this: after my apple-trees have been removed, I find the land admirably adapted to the growth of evergreen trees. You all know what evergreen trees are—the spruce, the arbor vitæ, the hemlock, &c. Without remanuring that land, without any repreparation, almost, except it be ploughing, I can set out evergreens, and get an admirable crop, because the elements which the evergreens call for still exist in that soil; because the elements which the evergreens call for are different from those which the apple-trees call for. I grow them three years, and then they pass away. What is the condition of the soil then? It is exhausted for the evergreen, it is exhausted for the deciduous tree, and you might say that the soil was entirely exhausted. But such is not always the case. I may plough that land thoroughly and lay it down to grass, without even putting any manure upon it, and raise a splendid crop of grass. Why? Because the grass calls for different elements in the soil from either of those kinds of trees. You see the point. It is so with the successful farmer. The time is coming when he will be

able to tell you just what crop to plant first, just what crop should follow that, and just what crop should follow as the third one, to get all the virtues of the soil, and keep it in good condition. Well, after I have taken off a good crop of grass for a year or two, that ground may be in very good condition, because it has recuperated itself, and the virtues which were exhausted by the preceding crops have been restored. Then I will go to work, remanure and prepare it, and perhaps raise another crop of apples, and so go on. That is the point I wish to bring to your notice.

Mr. WARD. Mr. Johnson stated that he had raised ninety-three bushels of corn to the acre. I would like to inquire the distance he planted his hills apart, and whether he planted it in drills ?

Mr. JOHNSON. Three feet and a half one way, and as near three feet and a half as they could be the other way. They might fall two or three inches short, on the average.

Mr. FLINT. It occurs to me that the members of the Board have done most of the speaking this afternoon, and, in fact through the day. I am sure there are very many experienced cultivators of vegetables in this vicinity, — in Dighton, Somerset and other neighboring towns, — who could not only enlighten the Board, but interest the audience, and I really hope we shall have an opportunity to hear from some of them.

Judge LAPHAM. At the present moment I am not much of a farmer. My early experience was in that business, and some part of my subsequent life has been connected with it, and it has been a source of very great gratification and pleasure to me to listen to the remarks that have been made here upon the subjects that have been under discussion. Perhaps it may not be amiss to say that the suggestions which have been made by the chairman in regard to the rotation of crops correspond to the operations of nature. Among my early recollections is one of a forest of oak, chestnut and walnut of very large growth. Some of those trees were cut down, and there came up, in the midst of those large old trees that were left, as thick a growth of white pine as I ever saw anywhere, and the trees grew with remarkable rapidity, and with entire thriftiness and health. That entire growth of pine was subsequently cut away, and and there came up a growth of maple, chestnut and oak; there

was scarcely a pine-tree on the field. Therefore, if we observe the handiwork of the all-wise Beneficence, it would seem to strengthen the conviction to which you have arrived in reference to the succession of crops. Moreover, in those countries where agriculture has been pursued for centuries, they have found by experience that certain crops exhaust certain elements in the soil, and therefore a different crop flourishes more advantageously as the successor of the one by which those elements of the soil were exhausted. There is such a thing as adaptation of the soil to the plant that is grown upon it. I recollect that in my boyhood a neighbor of ours, not more than half a mile from our house, could raise balm in great abundance, but could not succeed in raising sage, while my mother could raise sage but had no success in raising balm. The result was an interchange of balm for sage, without duty. It was an illustration of the reciprocity principle. Whether the production would have been promoted if there had been a duty placed upon the articles, I leave for others to determine; but that was a matter of mutual exchange — of free trade — and resulted advantageously. The conclusion to which I arrived in relation to it was this: that there were certain elements of adaptation in the soil where the balm grew that were not adapted to sage, and, *vice versa*, that there were certain elements in the soil where the sage grew that were not adapted to balm. So that, if we will devote our attention to observing the facts as they arise, and endeavor to seize hold of, and profit by, those which come under our observation, we shall, I believe, make progress in relation to this matter of agriculture in all its departments. Therefore, I regard that man as the most successful cultivator who most closely and keenly observes, before entering into the cultivation of the crop that he may wish to raise, the conditions of the soil in which it is to grow; and every attempt to force a growth contrary to the existing conditions of climate and soil must in the long run result in failure. Some peculiar conditions of climate and season in a particular year may operate to make the attempt successful, but in the long run, what is not adapted to the soil will not be profitable to the farmer.

Then, if we look at this matter further, we find that in certain sections of the country fruit is grown very successfully — in some localities, apples; in other localities, pears. So far as

my observation goes, certain kinds of pears will flourish abundantly in certain localities, and not in others. A gentleman from this place who went to New Hampshire,—I think it was near the town of Meredith,—told me he tried pears, and found that the trees would grow with great thriftiness for a few years, and then they would die. He repeated the experiment for a succession of years, and always with the same result. There must have been something in the climate or soil that was not adapted to the pear. I suggested surrounding them with coarse sand or fine gravel, and he told me he would try the experiment. I do not know what has been the result. I believe an analysis of the outer bark of the apple shows fifty per cent. of lime. What is the result of observation? We find that the regions where the apple is most productive are those regions where limestone is most abundant, other things corresponding. Now, in the early orchards of Massachusetts and New England there was sufficient vegetable matter, with some lime, in the soil, to produce results corresponding with the hopes or wishes of those who planted the trees; but in the course of years those elements became exhausted, and hence we do not have such remunerative crops as formerly. Can we not supply the deficiency by the application of lime? That is one of the necessary elements in the composition of fruit. I do not know how far that may be practicable. I was speaking to my friend Slade here on the subject, and he told me that he had in some instances applied mortar and old plaster to trees, and found that the trees were more productive and the fruit fairer.

Now, in order to be successful farmers, it is essential that we should study the elements that enter into the composition of whatever we wish to produce. We find, in relation to certain grasses, for instance, that by the application of certain mineral manures, some fertilizing elements are drawn from the atmosphere, which, in combination with the fertility of the soil, insure a good crop.

When I was a boy I remember there was an old field that was so poor that it would not produce sward enough to hold together. It was ploughed up and potatoes raised on it, some manure being placed in the hills. There was no grass seed sown, but to my surprise then, as I was less experienced then than I am now, a bunch of clover came up the succeeding

year in almost every hill where potatoes had been planted. The explanation, as I apprehend it, was, that plaster was put upon the potatoes when they were growing. Whence came the seed, how or in what way it originated, or where the germ came from, I know not, but the fact I do know as a matter of ocular demonstration.

A few facts of that kind will go to show that the nourishing elements of plants may come, to a certain extent, from the atmosphere, but they come mostly from the soil, and that soil must be adapted in its nature and character to the condition of the plant that grows upon it.

Last evening I was greatly interested in the lecture upon Utah. In that lecture Prof. Chadbourne stated that since the Mormons settled there and commenced their system of irrigation, Salt Lake had risen year after year, until it had risen many feet. You will recollect that he said that Prof. Henry had suggested that the theory that trees produced moisture was not well founded, and that perhaps the professor was right. It seemed to me that he refuted the theory suggested by Prof. Henry, because here were rows of trees set, here were grass and vegetables growing, and these combined, as absorbers of moisture, would have a greater effect than a forest, — at least in my apprehension. It seems to me, therefore, that so far from weakening the theory that forests produce moisture, the statements of the lecturer corroborate and strengthen that position. And in connection with that matter, I will say that I believe time will show that the effects of the tornadoes that sweep over our Western States may be to a great extent averted by the planting of belts of wood, and that the terrible drouths to which they are subject may also be avoided, to a considerable extent, by the same means. And I do not speak in relation to this matter without confirmation from high authority, because one of the greatest writers of France — Chaptal — corroborates that idea in the position that he takes in relation to the effect upon climate of the cultivation of the soil. We read, many of us, in our youth, of the desert of Sahara, over which, it was said, nothing but hot winds blew ; but further examination has shown that, instead of being a vast desert, entirely barren, it has broad oases or fertile spots in it, and who can say that the time will not come when even that desert may be made to blossom as the rose, and

become as fertile a region as Utah has become? In view of the progress that has been made in the last fifty years in relation to agricultural implements, and in all the sciences connected with this great matter of agriculture, I believe the time will come when that desert and many other places now regarded as barren will be made to blossom as the rose, and yield food for the sustenance of mankind.

I have had some experience in relation to the reproduction of animals, which some of my friends have regarded with considerable doubt at any rate; but I think I can state, without indelicacy, that, so far at least as domestic animals are concerned, the sex may be to a great degree determined by the course that shall be pursued in relation to their treatment. At least, such has been my experience, and I believe it to be a well-established fact. We are yet in our infancy in relation to all these matters. We have advanced somewhat from the condition of the people of the East, where they plough with a crooked stick, but we have been very slow in making these changes. I recollect when I was a boy, my father wanted to get a new plough. He had seen a cast-iron plough, but he was doubtful about its merits, and he went away with the determination to buy an old-fashioned plough, but inasmuch as he could not get one, the dealers where he went having nothing but the new kind of plough, he brought home, with fear and trembling almost, a cast-iron plough. We used it a week in the spring of the year, and if he could not have obtained another, at the end of that week a hundred dollars would not have purchased it. It is just so with regard to many things. We are but in the beginning of progress, so far as the observation and examination of the operations of nature are concerned; but we are on the high road to progress. None of us will live to see the advancement that will yet be made in all matters pertaining to agriculture.

Col. Stone. I have been very much pleased with the judge's remarks on this occasion. He has touched upon a problem which I believe time will solve. I believe in the goodness of God. I do not believe He has ceased creating. He is creating every day, and if we are disposed to look for the evidence of it we shall find it. The gentleman's remarks on that point struck me very forcibly.

Adjourned to evening.

Evening Session.

The Board reassembled at 7½ o'clock, to listen to a lecture by Mrs. Ednah D. Cheney. The audience was a very large one, and the speaker was heard with manifest interest and pleasure.

THE HORTICULTURAL EDUCATION OF WOMEN.

BY MRS. EDNAH D. CHENEY.

Ladies and Gentlemen:—I do not come before you to-night as an expert to give you any information as to the details of the noble science of agriculture, but only to present it to you in its relation to the great subject which is engaging all thoughtful minds in our community,—the education, employment and condition of women. I do not hope to give you any new facts, but only, if possible, to quicken and animate your thoughts, so that you may see the wide vista of usefulness and blessing which opens before us in the extension of this healthful pursuit to thousands whom custom, prejudice and inattention have hitherto kept from it.

Neither can I claim the charm of novelty for my subject. It is no new idea that women should till the ground and engage in all the varied duties of horticultural life. In the sober prose of fact, we find her in savage life bearing all the hard work of providing for the nourishment of the family. You remember the pathetic song of the negroes over Mungo Park —

> "We pity the poor white man;
> He has no mother to bring him food,
> No wife to grind him corn."

The pleasures of the chase, the excitements of war belong mainly to man; but woman does all the hard work. It is a great step in civilization when man begins to share her labors, and work is put upon a footing of honor.

In the inspired realm of poetry we find woman the helper in the field and the garden. The great poet, John Milton, all whose sins towards womankind may be forgotten in the large and beautiful vision he has given of our first mother, makes Adam cordially extend his invitation to her—

> "To prune these growing plants and tend these flowers,
> Which were it toilsome, yet with thee were sweet."

It is when thus working together, that their happiness wins the admiration of the angels of heaven, and draws them down to converse with Man. When Satan seeks to work mischief, his first step is to divide them.

I ask you to proffer this same invitation to the women of Massachusetts, to the thousands of women who need this occupation for the benefit of their health, for the increase of their means of support and usefulness, and for its educational value, in developing their mental and moral powers.

Do not say the career is open and they need no invitation: "God helps those who help themselves." We cannot live thus hardly with each other; we need mutual help, support and encouragement. True, God does not help those who do *not* help themselves, but he is continually inviting, encouraging and stimulating us to exertion; and we must all do the same good service to those whose energies are paralyzed by prejudice, custom and self-indulgence.

We ask for women only a fair field and no favor at the last; but those who hold the field must open the gates for them; not always oblige them to climb over the high walls, guarded with many a pointed spike of sarcasm and contempt. The few with great gifts and heroic energy of character will always make their way through all obstacles, but it is necessary to make a highway for the multitude to walk in.

Even now women share largely in the out-door and farming work of the world, but it is usually only as driven by excess of poverty, and in a low and degrading manner, which drives those of any higher culture or refinement as far from it as possible.

The slave-driver found nothing in woman's constitution which kept her from the cotton-field, where, bending hour after hour over her task, the lash came down upon her if she rose to straighten her weary back. No wonder that the emancipated colored women shrank at once from even the lightest out-door labors of gardening, as the men for some time preferred raising any other crop to cultivating cotton.

We find that in England, in 1861, there were among women fifty-six thousand three hundred and fifty-eight out-door laborers. But their work was not only of the poorest kind and very ill paid, but generally lasting only for a small portion of the year.

We desire to elevate the out-door labor of woman from this crude, savage, ill-paid, ill-regulated work, into an industrial calling, which shall fitly employ her mind as well as her body, and which will give a range of occupation suited to every degree of culture and refinement, from the most accomplished lady to the most robust and needy woman.

All classes need new light and life in this direction, and the influence will spread in both directions. Work will be elevated by mental culture, and intellectual education will be broadened and invigorated by an alliance with work.

The first point I ask you to consider with me, is the imperative need of out-door life to develop the physical constitution and preserve the health of women. It would seem needless to argue the importance of the health of the mothers of the race, to farmers and horticulturists, and yet strangely enough it has come to be considered an inevitable thing that women should be sickly in body and feeble in constitution. From the undeniable fact, that on the average, woman is physically less strong than man, the astounding inference has been drawn, that the weaker she is the more of a woman she is. Because she is a little smaller in size than man, reduce her physical proportions to the minimum of size; because she is a little less strong, make her as weak as possible. This would be strange reasoning to apply on the farm or in the garden. The willow is not so sturdy as the oak. Shall we starve it into a puny sapling? This is not the method of nature. She is constantly seeking to restore equilibrium. She carefully balances the masculine and feminine traits by the double parentage, and by the transmission of strong peculiarities in the opposite sex. She seeks to lessen differences, and in the finest types of humanity there is always something of the characteristics of both sexes. So art has followed her in its representations. The Greek Apollo has the beauty and grace of a woman, with masculine strength and fire; the Diana and the Minerva have masculine freedom and courage, with feminine beauty and majesty. Only in the extreme representations, as in Hercules and Venus, are the attributes of sex strongly emphasized. In later art, the most revered of men—Jesus of Nazareth—has been always represented with so much of the feminine attributes, that our masculine age is now protesting strongly against the painter's ideal.

But our one-sided civilization has sought to perpetuate the widest departures from the original type, and to produce a monster of curious formation, in which weakness and imbecility are the predominant traits. This physical degradation of woman has reacted upon the whole race,—the puny, sickly mother transmits her defects not alone to her daughters, but the sons partake of the very infirmities which they have allotted to their sisters.

It would be a curious study to trace out the extreme limits of muscular power in woman. Mr. Crafts told us last year of the Amazonian warriors of Dahomey, who take equal share with the men in all the dangers and toils of war, and who often enter into direct competition with them, and beat them on their own ground.

The Comte de Paris found that in some of the iron works in England, women are employed to stack large bars of iron after they have been hammered. For this labor, which no strong, healthy man would undertake for less than two shillings and threepence a day, they are paid only a shilling.

In Germany, Switzerland and France, women take part in all the labors of the field, and are harnessed with the cows into the plough, while the man walks lazily beside them.

We know what severe field labors the Southern women underwent under the oppression of slavery; a Southern planter once told me that women ploughed better than men.

Irving, in his Life of Mohammed, gives the following striking account of the strength and courage of the Arabian women, in the wars which were carried on for the extension of the Mohammedan religion. It shows how hardy were their habits, and how little their education differed from that of the men.

If according to the vulgar but erroneous idea, the Mohammedan did not let woman have a soul with which to take her share in the joys of the next world, he at least allowed a free development of the body, so that she had some chance for life and health in this. Irving writes: —

"This done, the captors went into their tents to carouse and make merry with the spoils, leaving the women among the baggage, bewailing their captive state.

"Caulah, however, was the worthy sister of Derar. Instead of weeping and wringing her hands, she reproached her com-

panions for their weakness. 'What!' cried she, 'shall we, the daughters of warriors and followers of Mohammed, submit to be the slaves and paramours of barbarians and idolaters? For my part, sooner will I die!'

"Among her fellow-captives were women, descendants, as it is supposed, of the Amalekites of old, and others of the tribe of Himiar, all bold viragos, accustomed from their youth to mount the horse, ply the bow and launch the javelin. They were roused by the appeal of Caulah. 'What, however, can we do,' cried they, 'having neither sword, nor lance, nor bow?'

"'Let us each take a tent pole,' replied Caulah, 'and defend ourselves to the utmost. God may deliver us; if not, we shall die and be at rest, leaving no stain upon our country.' She was seconded by a resolute woman named Offeirah. Her words prevailed. They all armed themselves with tent poles, and Caulah placed them closely side by side in a circle. 'Stand firm,' said she. 'Let no one pass between you; parry the weapons of your assailants, and strike at their heads.'

"With Caulah, as with her brother, the word was accompanied by the deed; for scarce had she spoken, when a Greek soldier, happening to approach, with one blow of her staff she shattered his skull.

"The noise brought the carousers from the tents. They surrounded the women and sought to pacify them; but whoever came within reach of their staves was sure to suffer. Peter was struck with the matchless form and glowing beauty of Caulah, as she stood fierce and fearless, dealing her blows on all who approached."

These instances show that there is nothing in the feminine constitution itself which prevents woman from bearing the hardest out-of-door work. The next question is, What degree of this work is compatible with the greatest health? Does excessive toil unfit her for the holy and beautiful functions of maternity? Without entering into a full discussion of this question we may assert, that while excessive compulsory toil impairs the health and disorders the functions of the system, it is less injurious than self-indulgence and idleness. Is there not a medium between the Amazonian warrior of Dahomey, or the slave woman of Georgia, and the pampered woman of

fashion, whose only labor is to kill the time? "Dire labor, indeed it is, and weary woe."

Indeed, so great has the disbelief in woman's physical powers become, that it is hardly thought possible that health can be her portion. Michelet, whose chivalric respect for woman amounts almost to adoration, considers her wholly as an invalid, a being whose tenderness and weakness call for the support and care of men and so develop beautiful traits in her, and kind and generous qualities in him.

Should this be the ideal of American women?

Is it not rather the effect of custom, derived from Oriental despotism which believes woman to be safe only within four walls, and dares not trust her God-given nature under the light of God's free heaven?

We must strive to make the home include the garden, orchard and the field, as well as the cooking-stove and the nursery. Health, work and love will make a home, which will be a safer shelter for woman's purity than prison bars and jealous keepers. We need to raise the standard of health for woman, so that she shall not be content with the life of semi-invalidism, which is the position of the majority of the sex at the present day.

How many a father toils night and day, to lay up a fortune for his daughters! What a fortune he might give them in health, strength and enjoyment, if he would only cast off from them the trammels of custom and prejudice!

How much money the quack doctor would make out of a medicine to cure the sufferings of woman, but the true medicine which is free to all, work and fresh air, is, like all God's best gifts, so freely offered that it is neither accepted with thankfulness or used with care!

The most trying and painful form of invalidism, which is strikingly characteristic of our American life, is nervous weakness and irritability. It is superfluous to argue the existence of a fact so well known to all medical practitioners, and we fear equally familiar to almost every home circle. This state is unquestionably due to the sedentary and confined life of women, and the intellectual stimulus of education, without the healthy corrective of physical exercise and out-door life.

A striking proof of this is found in the fact, for which I have the authority of more than one German physician, that nervous diseases are rapidly increasing among women in Germany. This is largely to be attributed to the exciting school life.

Admirable as the Prussian system of schools is in its intellectual processes, it fails to recognize the divine laws for the development of life and health. It is part of the machinery which cramps the individual to perfect the system. That culture which makes soldiers of men and invalids of women, is not the perfect model for our republican institutions.

Contact with the vegetable world seems to be nature's corrective for excessive mental action in any direction. The touch of mother-earth renews strength and energy exhausted in life's hardest conflicts.

As the air is purified by the life and growth of plants; as the water is kept sweet by the balance of animal and vegetable life, so the fresh, unspoiled life of nature seems to renew human life, to cool its feverish heat, restore its wasted energy, and bring it anew into harmony with the universal order of things.

Gardening requires simple, healthful habits. It is now as in paradise that the freshness of the morning invites to labor —

> "Awake! the morning shines, and the fresh field
> Calls us; we lose the prime to mark how spring
> Our tender plants; how blows the citron grove;
> What drops the myrrh, and what the balmy reed;
> How nature paints her colors, how the bee
> Sits on the bloom, extracting liquid sweet."

The gardener must be up early in the morning, but she need not keep midnight vigils; her charges go early to sleep and will not awaken her with their cries. Even the greenhouse is not kept so hot as our sitting-rooms and workshops. The plants are as sensitive to coal gas as our children's lungs, and will show the presence of bad air by unmistakable signs. But it is the out-door life of gardening which is most precious. It is not, as some suppose, confined to a few short weeks of summer; but from the first of April, or even earlier, when the snowdrop begins to droop its modest head, to the last of November, when the golden chrysanthemum gathers up the glory of the

summer, and breathes it out in its rich bloom and healthful fragrance, there is always something to be done in the garden.

Who does not experience the exhilarating effect in going out from the busy city into the woods and fields? And the nearer we come to nature, the closer our relations with the earth and its vegetable productions, the more strongly and sweetly do we feel this beneficent power. Especially is this influence good in all the grief and trial which come from emotional relations, from wounded sensibilities and crushed affections, to which woman's nature and circumstances render her so especially liable. There is no reproach, no taunt or sneer from the rose or the lily, and the fragrance of the flowers she tends silently soothes the sorrows of which they are unconscious.

Without probing the secrets of her heart, "they guess at the wound, and heal with secret hand." They minister to her who tends them with love from their Divine Creator, and she again is rich in the power to carry this message of love so beautifully written out to the sufferers who are shut out from their native world.

The physician may send his rich patient to the mineral springs, the seashore or the mountains, but the majority of women must find their restorative within the circle of their daily activities.

During the prevalence of the great cholera epidemic in the decade between 1830–40, the city council of Berlin assigned all the vacant lots of land in the city to the poor women to be used for gardening purposes. On them they raised vegetables for the use of their families. The result was a very great improvement in the health of the city and of the women engaged in the work.

In the vicinity of Boston many German women devote themselves to out-door work during the summer months. They are engaged in gathering smaller fruits and vegetables and weeding out lawns (which they are said to do much better than men), and in the laying out and preparation of gardens.

In many instances they have refused much higher wages for in-door work of various kinds, saying "We will not work in-doors while we can get out-of-door work. The rich ladies get their vacation in travelling, we must keep up our health and vigor by labor on the land."

A school-teacher finding her health giving out from her mental labors, and unable from the small amount of her salary to seek refreshment at expensive watering places, resolved to devote herself to her garden during her summer vacation. She found in the autumn that she had gained a greater degree of vigor than ever before, and that instead of a doctor's bill to pay, she had a hundred dollars in her pocket as the result of her summer's work.

Our climate is a pretty tough one, but like every other brave enemy, so often a friend in disguise, the only way to conquer it is to meet it boldly. None suffer so little from the weather as those who are out in it every day, and all day. Wise old Dr. Jackson used to say, "that the danger was in staying in the house," and it is most often there, by what in poetry we call "the family hearth and cheerful fireside," but which is too often in fact the air-tight stove and the hot-air register, that catarrhs and consumptions begin, and not out in the east wind or north-east snowstorm.

The next consideration which makes the wider opening of horticultural pursuits to women of great importance, is the wide field of profitable labor which it opens. Undoubtedly the question of woman's labor is an intricate and difficult problem; it is complicated by the fact that she is fitted by nature for part of the duties of life, whose value is so difficult to estimate in money that the world has settled the question by usually considering them worth nothing at all. The savage has his easy way of solving the problem of woman's work. He settles it that woman is to do all the work and he—none! This has the merit of simplicity, but has not on the whole been found especially conducive to domestic felicity or the development of higher qualities in either man or woman.

Chivalry took the other view of the subject, and exalting the lady into a porcelain angel, proclaimed her to be only the ornament of society. This, too, was consistent as regarded the lady of high degree, and chivalry took small note of any other. The noble lady was the ward of the state or king, who was bound to provide her with a dowry and—a husband. But at present we vibrate between these two extremes. The working-woman can do any work she pleases for very small pay, as in the Tyndale iron works, and the fine lady may do absolutely nothing, if she

inherit a fortune or have a rich husband to supply her needs. Between these extremes the great mass of women suffer from wasted energies, idleness enforced by prejudice and custom, feverish excitement caused by immethodical and ill-regulated work, and monotonous toil at the needle or the loom, repaid by a scanty pittance, which furnishes them no opportunities for self-culture or recreation.

A few facts in relation to woman's work in Germany will illustrate this point. At present there is so much admiration for German institutions that these instances of what woman's life is there struck me very forcibly, and as the same causes exist here to a great degree, the results must be somewhat parallel. In one city of two or three hundred thousand inhabitants there are 43,417 unmarried women who earn nothing, who contribute nothing to the national support or prosperity, but are mainly supported by relatives, the utmost they do being some little contribution to household work. But alongside of this is the painfully significant fact, that eighty per cent. of all the recipients of alms are widows, women who having given their lives in unpaid industry or idleness, and depended upon a man for all productive work, find their resources cut off by his death, and are absolutely unable to take care of themselves.

Out of a hundred widows in Berlin, eighty-three are obliged to earn their living. Another item shows still more plainly how badly this social economy works for women.

With advancing age the number of men who work for a living decreases; the number of women increases. The average man can from his work lay up a support for his old age. The average woman spends the best years of her life in idleness or in working for her husband and children only, and in her old age has to go to work for her bread.

Undoubtedly the case is worse in Berlin than it is here, for more of the old feeling exists against women's work there than here, but the prejudice is not obliterated, and few young women above the pressure of absolute want are taught to look upon their own exertions as the means of their future support.

We cannot afford economically to lose the work of so many women. With a large majority of women in Massachusetts, the productive industry of our State must gradually fall behind that of other communities, unless intelligent and thorough work is

done in due proportion by women as well as men. In the report of your Secretary, I read that the great demand of Western Massachusetts is for more laborers, and they call loudly for the Chinaman. Let the Chinaman come by all means, but give us work for the women first. Gardening is an occupation especially fitting to women, not only on account of its hygienic value, but by its power of adaptation to all the circumstances of her social life. We are quite ready to say, with Margaret Fuller, "Let them be sea captains if they will," and yet we can often imagine it a serious interruption to the home circle to have the wife and mother absent on a whaling voyage. Neither does the hum of the machine shop or the factory add much to the pleasure of the fireside. But the field, the orchard, the garden and the green-house, instead of detracting from the duties and joys of home, will only add to them health, freedom, comfort and beauty. Instead of the invalid mother lying on her couch, entreating her little ones to spare her poor weary head, we may have her out in the fresh air, with the children about her, aiding her in the labor which is to add comfort to the home, by supplying wholesome and nourishing food, and which will give grace and beauty to the home surroundings. She may superintend the work on a large estate, if she have abundant means, or with a little quarter-acre lot, she may even at odd moments raise the potatoes, beans or cabbages which are to give variety to the daily meals. Let me give you a few instances from my own observation.

In the neighborhood of Boston, a distinguished lady has now for many years found her chief interest and occupation in the management of her green-house and garden. With ample pecuniary resources, she has been able to indulge her taste, in producing the finest specimens in quality of flowers and fruit. She constantly takes the prizes at horticultural shows for peaches, plums, strawberries and other fruits, as well as flowers. Finding the men whom she employed unfaithful or incompetent, she took a young lad whom she has educated to carry out her plans. He is now, after fifteen years' experience, a skilful gardener, able to relieve her of all details in the care of her plants; while she enjoys the success of her plans and the perfection of her work.

In my own town are two young French women, who beside their labors in teaching, have cultivated their garden with their own hands, raising all the vegetables for their own use.

In contrast to these women of high culture and large opportunities, rises up before me the figure of a brave Irish woman, who when an invalid daughter and three young children were left to her care, worked all day in a mill, and in the hours before and after her daily toil with her own hands dug and planted her little garden, which, as she said, "always furnished them with provisions, so that through the whole dark period of the war, they never failed to have enough to eat."

This occupation is also specially adapted to women by its educational value. The great defect in woman's education is, that it has no practical bearing. She learns statements, tables and facts, but seldom rises to the perception of laws and their application.

Although exercising the most important function in the care of the health and life of the human race, which during the dangerous periods of infancy and youth is almost entirely confided to her care, she is yet commonly ignorant of physiological laws, and accustomed to base her actions upon vague tradition, or a blind reliance on outside authority. If her children are taken sick and die, she esteems herself unfortunate or providentially afflicted for the good of her soul. But she rarely traces out the causes of disease in the insufficiency of her own knowledge, or the unfaithfulness of her care. But sympathy and religion are not expected to console the gardener for the loss of his crops. Science has plainly demonstrated that "as we sow, so must we reap," and woman as well as man when she practises horticulture, will seek out the cause why her neighbor's potatoes and cabbages are better than hers, or her rose-bushes are devoured by slugs while his are free. All that she learns in this department will have its value in her maternal and home life. And then again, the love of beauty, so prominent in woman's nature, may find here its full development. From the laying out of an estate to the arrangement of a bouquet, there is opportunity for all the order, symmetry, color and sentiment which can be expressed in outward symbols. Use, love and beauty are all combined in the work, and from the solid foundation of material economy, may be built up a structure of

grace and beauty, which lifts her occupation into the region of art.

Moreover, the very laws and conditions of vegetable life are full of instructive analogy to human life. The mother will gather many a lesson of wisdom in rearing these mute but sensitive creatures, which will guide her in bringing up her more precious charges. I remember the comfort which a young mother, over-anxious about a delicate baby, received from a horticulturist who told her that he had often observed his plants which seemed quite feeble the first year, gain health and vigor in the second year by judicious care. The sturdy, healthy boy now rewards his mother's faith in nature's teachings. So the garden is full of the most suggestive illustration of moral and religious truth. The most spiritual of teachers told us to "observe the lilies how they grow"; and drew precious lessons from them. Often when the mother seeks diligently for words sacred enough in which to impart the holy mysteries of religion and life, she will find, as Wilkinson has wisely said, that the processes of nature in the growth and development of plants will supply her with the pure and beautiful symbolism she needs in which to clothe her thought.

But the full value of Horticulture for woman, either as improving her health, increasing her industrial resources or developing her mental powers, cannot be gained by desultory attention to this work regarded only as a elegant amusement, or as an adjunct to ordinary pursuits.

That the stream of culture may flow beneficently through all the community, we must raise the fountain-head high; at some points women must devote themselves to the science of horticulture, or to the practice of it as a noble profession, giving it their best energies, and reaping its richest rewards.

Michael Angelo well said that the light of the market-place was the true test of the value of the statue. It is so with all work. The dilettante and the amateur are never sure that their faults are not partially glossed over by the courtesy of society; but the price current is no respecter of persons, and the best strawberries will command the highest price, whether raised by man or woman. It is this test of fair and open competition alone, which will give to woman's work thoroughness, finish and completeness.

We all know how much pains have of late been taken and what large sums have been expended to further the agricultural education of young men. Others can tell you the methods and results much better than I can. Within the last three years, efforts have been made in this community, to extend the same advantages to women. Miss Emma Marwedel, a German lady, came to this country, as affording better opportunities and freer scope for developing her plan of an integral education for woman, including horticulture. Owing, perhaps, to the largeness of her undertaking and to other reasons, her scheme has not met with definite success, but the large esteem and sympathy offered her show a consciousness in the public mind of the value of the thought which she represented.

Even before her arrival many thoughtful women in our own country had turned their attention to this subject.

The New England Women's Club of Boston, held many discussions upon the best means of calling the attention of women to the practice of horticulture, and after much deliberation, a society was organized in Boston, whose object was to provide a horticultural school for women. They hoped to arouse a general interest in the subject, and to prepare at least a small number of women to undertake gardening as a business.

Soon after beginning their preparations they heard of two other institutions which might at some time be in a condition to undertake this work.

It was rumored that the fine Bussey estate in West Roxbury was to be devoted to a general school of agriculture and horticulture, under the direction of Harvard College. The society conferred with some of the officers of the college, in regard to coöperation in the chosen work, by opening the school to women. But at this time they received no encouragement that such would be the case.

Mr. John Simmons also left a large bequest to found a college for the industrial education of women, and it was understood that horticulture was one of the objects to be promoted by the institution. But after conference with one of the trustees, it was found that the restrictions of the will were such, that no practical work could be undertaken for many years, and it was doubtful in what direction the resources of the fund would be used.

The directors of the society therefore decided to go on with their own independent school, on a small scale; the number of applicants for admission seeming to show that many young women were ready and desirous of an opportunity for instruction. They accordingly hired a small estate near Boston, put up a green-house, and opened the school for theoretical and practical instruction in horticulture.

They have had at no time more than seven or eight pupils. This fact has been mainly owing to the large expense necessarily attending the school, as it was not endowed with any permanent funds. The cost for board and tuition was about $400 a year, a sum usually beyond the means of women who are looking forward to supporting themselves for life. Few fathers have yet learned to look upon education for women as a profitable investment for the future.

After the school had been in operation more than a year, the society received an offer of $5,000 from Miss Nabby Joy's estate, as the foundation for a free scholarship. It therefore became incorporated, with right to hold real and personal estate.

Last spring, when Harvard College published its programme for lectures at the Bussey Institution, it announced that the lectures on chemistry, entomology and horticulture would be open to women, with opportunity also for practical experience in the garden and in the green-houses.

Thus our venerable Alma Mater has opened two little side doors to the daughters of Massachusetts, in the university lectures at Cambridge, and the Horticultural College at West Roxbury.

We trust that ere long, obeying the spirit of the age, she will fling wide open her portals to sons and daughters alike, crying only, "All ye who thirst, come hither and drink."

In some important particulars the plan of the Bussey Institution differs so much from that of the Horticultural School, that we do not yet feel sure that it will wholly supply its place. It is a branch of Harvard College, and supposes its pupils to have already shared the advantages of that venerable institution. It therefore gives no elementary instruction in any of the sciences connected with horticulture, but only lectures on their application to the special object of the school. As young

women are not admitted to the previous studies at Harvard, this puts them at a disadvantage in comparison with young men. Still, I think graduates of our good high schools would find no difficulty in following out the course at Bussey.

At the school at Newton it was especially desired to give an opening to those women who are at once anxious to make horticulture a profitable business, and we therefore tried to provide them a good home at a low price, where they could live at a cheap rate while pursuing their studies. At West Roxbury no such provision is made for either men or women, so that its advantages are at present confined to those who can live within a convenient distance.

So strongly did the directors feel the need of these additional opportunities for women, that they considered the project of establishing a home school in the neighborhood of the Bussey Institution, where young women could live and study under careful superintendence, and yet have the opportunity of attending the college lectures. But the subject is yet so wholly new, and the Bussey Institution offers so much that has never before been within the reach of women, that the directors do not at present feel justified in asking from the public the means to support a separate school.

Retaining their organization, they will use the interest of the funds in their hands, in assisting women of superior talents and persistent determination of purpose, to obtain an education in horticulture, either at the Bussey Institution or elsewhere, and will endeavor to spread the idea of the fitness of this occupation for women, and to awaken an interest among them for the work. The President, Miss Abby W. May, and the Secretary, Miss Lucia Peabody, of Boston, are a committee for the management of this fund, and will decide upon its appropriation.

Their two years' experience has been of great value in testing the truth of the ideas which I have endeavored to enforce. The pupils have been from the most cultivated classes in society.

One point of great interest was in regard to the effect of the school life on the health of the pupils. The impression seemed to get abroad that the school was to be a hospital or sanitarium

for invalids. The directors in vain tried to disabuse the public mind of this idea, and were obliged to refuse many who wished to come, for this reason solely. Owing to the house not being full, a few persons were received as boarders, who did not undertake to do their share of the work of the school. For it was no play gardening. There was hard work done, and a great deal of it. Except the original preparation of the ground, which was in a very rough state, and the tending of the furnaces, &c., the pupils with their teacher, although so few in number, which made it much harder, did all the work in the garden and green-house.

The first spring was especially cold and chilly, and the following summer was unusually dry, hot and uncomfortable, but the young women worked several hours a day in the garden, and there was not a case of sickness, or even severe cold in consequence. They took charge of the green-house in winter, of all the potting of plants, slips, cuttings, &c., the regulation of heat, by night and day, without suffering at all from exposure, although the situation of the green-house obliged them to traverse a considerable distance in going to and from it.

We watched, with some anxiety, even those who were considered perfectly healthy, lest the unusual labor and exposure might have bad results, but after careful inquiry from both directors and pupils, I can safely affirm that there was not an instance of any sickness attributable to their occupation. A few who came as invalids were not miraculously cured, but they all felt much better for the work. The relief from wearing sedentary employment, the life in the fresh air, and the absorbing interest of the occupation proved potent cordials to them. Every one interested in the school felt thoroughly satisfied of its beneficial results in this respect.

Still, we would not be understood as recommending gardening as a universal panacea, which will cure all the ills of life, though used without care or wisdom. It is possible for men or women to get rheumatism by kneeling on the damp ground in the spring, to attend their hot-beds. And yet a physician assures me that she finds that even her invalid patients do not take cold from it as she expected. It is strength to bear exposure, not freedom from exposure, which insures health.

One may experience evil results from too long remaining in the warm, damp air of ill-ventilated green-houses. But gardeners of long experience tell me they have suffered no evil from their work.

The same conditions of free circulation and purity of air, which are essential to human health, are important to the life and growth of plants.

The careful drainage which farmers prize so highly, improves the health of the neighborhood, and though it is certainly possible for farmers and gardeners to get sick, there is no excuse for it in their occupation if rightly managed. Like every business it has its advantages and trials. We must use prudence and intelligence in overcoming its difficulties.

Our experience was too short to be of much value, in regard to the economic results of woman's gardening, although the sales from the green-house and garden were quite equal to our expectations.

One of the pupils has opened a green-house in Brookline, under favorable auspices, and will test for herself the possibility of her success in business. She has already a fair prospect, although she had but little capital to start with, and is now able to meet applications for plants and bouquets.

It certainly shows the wisdom of Harvard College in opening the school to women, that the only attendants on the lectures at first were young women who passed into it from our Horticultural School, who are pursuing their studies there with great interest. Even now women are in a decided majority there. I trust that this will not long be the case, however, as I believe that men and women would study and work together with as great mutual advantage there, as Adam and Eve did in the first Garden of Eden.

I hope that the young women of our community will not be insensible to the advantages offered to them by this richly endowed institution.

I have no doubt that its officers and professors are sincere and hearty in their intention to give them every opportunity for useful study and practice. The ignorant farmer or gardener no longer stands an equal chance with his educated neighbor, and women, in entering on this profession, must make the most of every advantage open to them.

The experiment of the Bussey Institution is yet too new to make it proper to criticise its methods or predict its success. Its efforts must be tentative, and its officers must learn from experience, what are the needs of those who are to enter on this work as a practical profession.

With such ample means, and the best intelligence of the community to guide them, it ought to become a source of the widest influence and the greatest good. It is especially valuable as combining high intellectual culture with manual labor.

For the same reason we welcome the example of Vassar College in organizing a floral department, and encouraging pupils in the intervals of intellectual study to work in their gardens.

We especially need to conquer the prejudice which connects the idea of manual labor, out doors, with a servile or impoverished condition. Women, too, must learn to respect the idea of working for money. Labor gains in dignity, instead of losing, when it is done for the benefit of others, and not for our own enjoyment. And money is a very simple and convenient test of the value of our work. To work well, and sell the products of your work, is the surest way of benefiting the community. She who, by the improved culture of strawberries, shall put down their price ten cents a box, will place them within the reach of many a poor, feverish sufferer, to whom she cannot directly minister; and by the intelligent care of her green-house, she may help to produce flowers in such abundance, that it will be no longer the exclusive privilege of the rich to place the winter rose in the cold hand of the departed friend.

Many women have been very successful at the West in cultivating farms and gardens, and also in Vineland, New Jersey, where they share in the management of the gardens.

But we cannot rely mainly upon colleges or schools to make this occupation general among women. Only a small number of those who need out-door occupation will ever be able to attend them, yet if they do their work well their good influence will be widely felt.

It is not Harvard College alone which has educated New England; not Amherst to which we owe the rapid improvement in agriculture, during the last few years. So we cannot expect

that the Bussey Institution will do all that is needed to induce women to give their minds to this work. We want a wide-spread interest in the subject. I rejoice in the welcome which this Board gives to women at their sittings, and I trust that those who have a practical acquaintance with the subject will take active part in its discussions. It is not at all unusual for women to take prizes at horticultural shows. I hope in future, at agricultural fairs, they will display squashes and turnips, melons and pears, of their own raising, instead of patch-work bed-quilts, worsted work of strange device, and paintings which savor strongly of boarding-school teaching.

Women need to grapple with realities and take hold of the real work of the world earnestly, not merely to employ odd moments in useless prettinesses.

I am told, by those who have lately been in England, that it is delightful to see the rapidly-growing love of horticulture there among all classes. The magnificent floral exhibitions in London are attended by all the wealth, fashion and beauty of the great metropolis, and ladies of the highest rank discuss, learnedly, the merits of a new seedling, or favorite variety, as they do the charms of an opera singer. This results very much from the love of country life so common among the English aristocracy. But the taste is spreading very fast through all ranks. Rows of houses built to let are provided with hanging green-houses. In that milder climate, the simple protection of glass is all that is needed for many choice species of plants, and every house is proud of the display made in its windows. With us it has been found that no money brings in a greater return of health and pleasure to the family, than that spent in the little green-house opening out of the sitting-room or parlor. It should not be an exclusive luxury for the rich; it may be brought within very moderate means.

I remember one family of women who, having little property but the house in which they lived, have supported themselves for years by the needle—one pet sister excepted, whose artistic talent has been widely fostered to be the joy and pride of all. As they sat sewing in their pleasant room, always full of house-plants reared by their own care, and talked to you of the choicest works of art and literature, even the poor labor of sewing seemed to lose its primeval curse, and they seemed free

and happy in it. A small sum of money having been given them to use for their pleasure, they unanimously agreed to devote it to a green-house, in which they could more perfectly raise the flowers which they love so much. Now they have their little winter garden, always fragrant with beauty, giving them refreshment after toil, and cheer and comfort in every hour of sadness.

It has always seemed to me that flowers were the most perfect expression of the Divine Love. They are useful, it is true, but the practical does not obtrude itself; they seem to bloom for the sake of expressing the love and joy that call them into being. There is no joy so sacred, no sorrow so profound and sensitive, no human love so tender and so true, that it may not find expression in these beautiful symbols. They do not intrude; they are never out of place. The peasant may bring the spring daisy to a queen, and feel that it is a fit offering; the lover brings a rose to his chosen maiden and needs no other words; we place the lily on the altar and it requires no consecrating touch. I have seen poor little children pick up the withered bouquets which had been thrown out on the ash barrels of wealthy houses, and have felt how universal is this love of the beautiful, and what a good work he is doing who helps to put flowers within the reach of all.

So, too, our poet philosopher has well said, "If a man should send to me to come a hundred miles to visit him, and should set before me a basket of fine summer fruit, I should think there was some proportion between the labor and the reward."

Other considerations might be named, incidentally showing the advantages of out-door life and occupation for women. It certainly would tend towards a reform in dress. Imagine a fashionably dressed woman, with trailing skirt, flounces and bows, with streaming ribbons, and dangling laces, engaged in pruning her bushes and rearing her vines; the feathers of her hat catching among the branches, the trains of her skirts knocking down flower-pots in her green-house; her garments bearing witness of nature's great provision for carrying seeds to a distance.

Does it not show that devotion to a useful and simple work will inevitably tend to produce a simple and convenient style of dress? Whether it should be the short petticoat and broad hat

of the Swiss woman, or the English beaver hat, coat and waistcoat of the equestrienne, or the much derided Bloomer costume, is uncertain, but it is absolutely requisite that the gardener should have shoes which will not melt like salt with the least drop of rain or dew, skirts which are not ruined by contact with mother earth, and will not tear with the first touch of a bramble, waists which are loose enough to allow free use of the arms, an arrangement of the hair which will bear both wind and moisture, and a hat which will stay on the head under all disadvantages.

Since we admire the Greek Diana, "the chaste huntress with the silver bow," we can certainly imagine a costume which will admit of all this and yet be both classical and becoming.

I once received a visit from two ladies from the country. As I had lately had a bride for a visitor with trunks which, like the Vicar of Wakefield's family picture, could not be got upstairs or into any room in the house, I was as much pleased as the hackman, with the very modest size of their trunk. I said, "Is this all the baggage you have brought?" "Oh! yes," they replied. The next morning one of the ladies brought me down a fine large Hubbard squash of her own raising, which had also come in the trunk! It filled up the measure of my amazement, and set me to thinking whether, when ladies prided themselves on taking choice specimens of squashes and pumpkins to the city, they would not economize in the size of their hoops and the number of their flounces. A gourmand who was very fond of pork, had tried every means of giving it additional flavor and relish. He had eaten it broiled, and boiled, roasted and fried, in brawn and in sausages, and every other imaginable way. At last he said, "I wish I had been born a Jew, for that sense of a forbidden luxury is the only thing which I can imagine would impart a new relish to pork."

Now as the season of Thanksgiving approaches, all the arts of the housewife are exhausted to give new zest and flavor to the "Thanksgiving dinner." Would it not, O devoted husband and father, add a charm to this long cherished festival, to know that the pumpkins and squashes were of your wife's raising, or that the ruddy glow on the apple reflected the blooming cheek of your daughter, made healthy by the summer spent in the orchard or garden? Would it not indeed make a new day of thanksgiving and praise for us all, if the hours now given by

women to idle and frivolous pursuits, could thus be employed in adding new comfort and beauty to life, "so that the wilderness and solitary place should be glad for them, and the desert should rejoice and blossom as the rose"?

Maj. PHINNEY. I move that the thanks of the meeting be tendered Mrs. CHENEY for the beautiful and highly instructive lecture to which we have listened.

The CHAIRMAN. It has often been thrown in the teeth of our lady friends that the first woman sinned herself and the race out of the Garden of Eden; but her representatives, like Lady Macbeth, who, after inciting her husband to the murder of the king, repented, and sought to keep him from the commission of further crimes, have ever since been trying to get us back; and they have now inaugurated a system by which they hope to lead us back to that garden, and assist to cultivate it. Mrs. Cheney is connected with the first institution for that purpose ever established, and I hope that the State Board of Agriculture and all farmers will help on this good work, whose results will be the advancement, not only of woman, but of men,—husbands, fathers, brothers and sons. I take great pleasure, therefore, in putting the resolution.

The resolution was adopted unanimously.

Rev. E. PORTER DYER, of Shrewsbury, then read an amusing poem, which was frequently interrupted by laughter and applause.

The Board then adjourned to Thursday morning, at half-past nine o'clock.

THIRD DAY.

THURSDAY, December 23.

The session opened at half-past nine o'clock, and Maj. PHINNEY, of Barnstable, was called to the chair.

The Chairman stated that the first subject for discussion was

CATTLE HUSBANDRY,

which was opened by a paper by the Secretary of the Board, on "The Principles of Breeding," of which the following is an abstract:—

The natural laws which apply to the increase of the stock upon the farm are comprehended under the general term of the principles of breeding. Every farmer has observed marked peculiarities in his animals. Some of them fatten readily, for example, and pay by their rapid increase of weight for all the food they consume, while others do not. Some cows in the dairy pay richly by their abundant yield, or by the high quality of their product for the cost of keeping with the addition of an abundant profit, while others fall below this point and actually entail a loss upon the owner. There is a want of uniformity, a great difference in the intrinsic value, and the object of the intelligent breeder is to search out the rules which govern the results he seeks to obtain, and to ascertain what system he can adopt to make sure of attaining such results. Experience has shown that the same fixed or natural laws apply uniformly to all classes of stock, as horses, cattle, sheep, swine, &c., but there is always more or less difficulty in their application in practice, from the imperfect knowledge we have of the peculiarities of individual animals.

The old maxim that "like produces like," is liable to be misapplied, and the error will appear in certain contradictory results which we find from time to time in the course of our experience. This arises in part from the fact that certain qualities are latent or hidden and do not appear to the eye. In order to breed with certainty, it is essential that the qualities we desire to obtain should be inherent in both parents. If the two animals possess opposing or unlike qualities the characteristics of the offspring will follow the one which possesses the strongest hereditary power, or the strongest power of transmitting its peculiarities, the greatest unity of influence and fixity of type.

If both parents possess a like character and fixity of type the result will be a character similar to that of the parents, but in a more distinctly marked degree. Two animals possessing this strong similarity of characteristics will not only perpetuate their corresponding peculiarities, but intensify them in their offspring, and each successive generation which they produce receives an increase of hereditary force or power of transmitting its own peculiarities. But this power invariably diminishes if the parents instead of possessing this likeness of character really possess opposite or antagonistic characteristics. We cannot

judge wholly from the form and apparent qualities of the animal, because many of the most valuable characteristics of a breeding animal are latent and hidden. We are compelled to fall back upon what we know of the history of the individual animal, or the length of time it has been bred with care, to judge of its capability of transmitting its peculiar qualities, relying upon the knowledge we have of the general principles of breeding, that the qualities sought are inherent and well fixed in the system.

In breeding, therefore, the first important rule is to breed only from the best, but not merely the best looking, or the animal that fills the eye the most completely, but from one that has the capacity of transmitting his good qualities in the highest degree, and the strongest evidence of this is the knowledge we have of the qualities of his ancestors for several generations, unless we have some of his stock to tell as plain a story to the practised eye of a judge of cattle.

The quality of what is called a pedigree is more important than its length. It is of little use or satisfaction to trace a pedigree back through inferior or ill-bred stock, except as a warning against the animal, but the longer it is the better, provided it shows a high character in the ancestry, because the hereditary power is cumulative, and becomes stronger and more intense and fixed from generation to generation where the respective parents possess similarity of characteristics, as is commonly the case in our well established breeds. In breeding dairy stock it is of special importance to study and to know the quality of the stock from which the male has descended.

The milking qualities of the cow are not confined to any particular race or class of stock, but exist to a greater or less extent in all the well established breeds, and in cows of no known breed, like the common stock of the country, but some classes or families have been raised with greater attention to this point than others, so that high dairy qualities have become the rule in some breeds while they are the exception in others. In other words, though the secretion of milk is natural and common to all animals that suckle their young, the extraordinary development of this secretion is artificial,—the result of care and breeding. The quantity of milk which a cow is capable of secreting depends much upon the supply of blood which

passes into the mammary glands, but especially upon the activity of those glands, but the quality is governed more by the internal structure of the animal.

In subjecting the animal naturally wild, to a state of domestication so as to modify its form and system, we do it at the expense of certain qualities for the sake of attaining other qualities better calculated to promote our immediate interests. The vitality or vigor of constitution is weakened as well as the reproductive power, but the formation of fat or the tendency to produce meat, and the profitable yield of milk may be largely increased. Now as these qualities, the extraordinary development of which is due to domestication, are artificial, there is a constant tendency to revert to the natural condition, so that constant care is required to preserve what we have gained, by careful selection of individual animals from which to breed, especially to see that the male comes from a stock or family remarkable for the production of milk.

It has been found that animals that possess a strong tendency to secrete fat in the system seldom unite with it a strong tendency to secrete milk. Indeed the reverse is commonly true, and there is a marked deficiency in the formation of milk. When food is taken into the system, the first process is that of digestion, then follows the separation or preparation of nutritive parts for entering into the circulation of the blood. Individual animals differ greatly in the completeness with which this process is effected. In some there is a much greater loss of food than in others, and the completeness and economy with which this separation of the fatty elements of the food is effected varies according to the internal structure and organism of the animal itself. Perhaps it is owing in part to the fact that one animal masticates, and grinds up, and digests its food more perfectly than another.

Milk is secreted from the blood. If the blood is thin and poor and but slightly charged with the rich elements taken up in the food, the milk is of necessity poor and watery, and the quality will usually bear an intimate relation to the quantity produced. If the organization of two animals is such that they separate or eliminate the fatty elements of the food and store it away in the blood equally well, they accomplish the first step in the process of conversion of food with equal economy, and, so far as this goes, it is the same whether the subsequent use to be

made of it be to form the fat or butter in milk or the fat and tallow of the body. In other words, the economical preparation of the raw material of the food, that is digestion, and separation of the elements of nutrition, is equally important for the fat in the blood, whatever may be the ultimate form into which the animal system is to convert it. But the internal structure which accomplishes this process differs widely in different individuals. One animal will effect this elimination completely, with the least possible loss or waste of food, while another will fail to extract the fatty or nutritive elements of the food and allow them to pass off unused. It follows that animals whose structure is best formed for fattening are also best formed to fulfil the first conditions essential for the production of rich milk.

There are organs for the deposition of fat as well as for the secretion of milk. The former are called the adipose tissue, the latter the mammary glands. The object in breeding stock for the dairy is to stimulate the mammary glands to the greatest possible activity; that is, to increase their energy as compared with the other organs of secretion, and to prolong their period of activity; and they are, to such an extent, subject to hereditary influence, that great progress has already been made in increasing their power to perform their natural functions, as we see in the establishment of breeds remarkable for the production of milk, while a neglect of this point has, in some instances, so reduced the energy and activity of these glands that whole classes of animals have ceased to yield milk in quantities to be profitable upon the dairy farm.

With respect to those breeds where the tendency to produce meat has been developed, and the milking qualities overlooked or sacrificed to early maturity, no doubt we could by judicious management bring back the condition of the mammary system to a high standard of efficiency, but we should be likely, in doing it, to reduce the tendency to the economical supply of meat, or, in other words, we should impair the value of certain very important qualities which have been highly developed for specific purposes, and get only what we find already highly developed in other breeds, for, whether the two qualities are irreconcilable or incompatible in the same animal or not, they have not, as yet, been combined with any great degree of success. It is better policy, on the whole, to aim to breed for specific purposes

and to develop the highest capacity for such purposes in separate breeds.

The remaining portions of the paper were devoted to the consideration of the application of general principles to the practical details of breeding stock for the dairy, but as they elicited little discussion upon the points to which they refer, it is not thought important to present them in this connection.

Mr. JOHNSON. I would like to ask the speaker whether he prefers to have a heifer come in while in the barn, or while upon grass?

Mr. FLINT. As a matter of practice, I should prefer she should calve a little while before going out to grass. If she goes out to grass a week or a fortnight before calving, it will stimulate the mammary glands to such an extent that they often become painful to the animal, and in many cases she has to be milked before calving. It is desirable to avoid that, if possible. If she comes in two weeks before going out to grass, at the end of that time her udder will have come into its normal condition, and then there is no harm in stimulating it to its utmost capacity. But with young cows, a difficulty with the udder should be avoided, and I think it would be avoided by having them come in a little before they go out to grass.

Mr. JOHNSON. That is my own opinion.

The CHAIRMAN. Mr. Flint has opened a field for discussion which will prove interesting to the Board, and to the citizens present, and I hope it will be continued by gentlemen here who thoroughly understand the subject of cattle husbandry.

Mr. BUFFINTON. Mr. Flint spoke of milking cows before they calved, in which I have had considerable experience, and I am really undecided whether the practice is a good one or not. I would like to hear the opinion of those who have tried it. We have had more cows troubled with milk fever this last year than ever before, and we have rather laid it to milking them before they calved.

Mr. FLINT. Where a cow is turned out to grass before she calves, it sometimes becomes a matter of necessity; it would be a positive and permanent injury to the cow in some cases if she were not milked, but it is to be avoided, if it can be. I think it rather an injury to the calf, and I would rather avoid it if possible. In

doing it you see it deranges the ordinary course of nature at that time. Nature has provided a peculiar quality of milk, especially adapted to the wants of the young calf. It contains peculiar chemical properties, which are absolutely indispensable for the calf at that time. Now, if you begin to milk the cow before she calves, that order of nature is interrupted, of course; that peculiar character of the milk is to some extent modified. I think it is desirable, as I said before, to avoid it when it can be, but rather than see a cow suffer, or see her udder injured, perhaps permanently, I should certainly milk her. I should like to hear Mr. Ellsworth's experience on that point. He is a very large dairy farmer and breeder, and perhaps has more cows in milk through the year than any man here, and he must have had many cases where he has been obliged to practise one way or the other.

Mr. ELLSWORTH, of Barre. The question put by the gentleman on my right (Mr. Buffinton) was, I think, whether or not a cow should be milked before calving. Under some circumstances we are obliged to do so, but, as Mr. Flint has very properly said, it should be avoided if possible. When I have such a case come up, I immediately put the cow on a low diet. Even if it is the season of a great flow of milk, I put her in the stall half of the day; I will keep back that way if possible, and by doing so I have very many times avoided this milk fever that the gentleman speaks of. In certain cases, however, it will come up, and in such cases I put her on a low diet. I feed no corn the first ten days after calving, if the cow is in fair condition; if she is rather old, I give her oats, which are somewhat stimulating, and will increase the milk. But if she gets into a bad state, which many of our large milkers do, we are very careful not to let the calf stay upon the udder any length of time; for if you do let the calf work upon the udder when there is no milk there, as many people do, thinking (as is perfectly natural) to fetch the fever out, you will injure the quarter to which the calf sticks; he will hang to any teat he gets hold of, and that quarter will be somewhat emaciated, and it will not come back when you go to milking again. That is my experience.

There are many things about a cow, when she is coming in, if she is a good milker, that people generally do not understand. It is the most critical time to take care of a cow that I find. If

I am at home, I trust to no one to do it. She should have a dry place, any circulation of air should be avoided, for the organs are very delicate at that time; and when I manage my cows myself, I very seldom have any trouble; but when I have not been at home, I have found trouble.

Mr. Buffinton. Last spring, I had a case of a cow that it really seemed ought to be milked. I did not wish to do it, for I was afraid of the milk fever afterwards, which my experience had shown me was likely to follow. I gave her two doses of aconite, eight or ten drops to a dose. I happened to discover the effect of aconite in drying up the milk two years ago.

Mr. Ellsworth. A gentleman asks me what I do in case the udder becomes hard. I treat it very differently from the old-fashioned way. The old method used to be to apply Indian meal and cold water. I immediately apply warm soft-soap suds, with the hand, very gently, very carefully, and continue it for some time, and work over the udder until it is perfectly dry, which will be very soon if there is fever there. I repeat the application once in four hours, and I have never failed to take out the hardness.

Question. Did you ever try saltpetre?

Mr. Ellsworth. I think I have; but I have done with everything except the treatment I have mentioned. I ruined some very nice cows in the early part of my management, but for the last few years I have been able to control it.

Mr. Loring Moody. I think there is no subject of deeper interest or greater importance to the agriculturist than this one upon which Mr. Flint has spoken to-day, and which is now under consideration,—that is, the method of obtaining the best types of animal life; I mean, of course, those animals which serve us. But while I would do everything in my power, if I were the owner of animals or a dealer in them, to increase their physical qualities, I would endeavor also to increase their mental and moral qualities. What we want in all sorts of animals is gentleness, docility, good temper, good disposition. We can get a great deal more, and I think a great deal better meat out of our beef animals, and our mutton animals, and our pork animals, by developing in them kind and docile tempers, than we can by keeping them at arms' length from ourselves and making

them ferocious; and so you will find that the law of kindness will have its influence upon breeding animals.

Mr. Ellsworth, of Barre. As Mr. Flint spoke about heifers coming in at two or three years old, I will say, that we cannot afford, I think, here in Massachusetts, at least, to wait for a heifer to come in at three years old; we want them to come in at two years and a few months old. I agree with Mr. Flint in regard to the time of coming in. The animal should calve before she goes to grass and fills up with milk-producing food. After that we may stretch her milking capacity. I am convinced that we can teach a heifer to give milk; I have no doubt of it at all. I generally raise what I use, say half-a-dozen a year, and I invariably use the full-blood for my males, and sort out what I call the best qualities; so, with half-a-dozen a year, I hardly ever fail of drawing perhaps one prize, three good ones and one blank,—the blanks will come in once in a while.

But I merely rose for the purpose of saying that the time for a heifer to come in is two years old rather than at three, for it makes fifty dollars difference in the cost of the cow, and you will get a better cow by teaching her to give milk.

Mr. Converse, of Palmer. I would state, in reference to this milk fever, two cases that have come under my notice within about a year. In one case a man had just bought a cow, for which he paid a hundred and fifty dollars, and he came to me and said his cow was going to die. I went to see her, and found her all in a tremble. There were one or two physicians there who said she must die. I asked him if they had bled her, and he said they had not. I said that, in Germany, the old rule was to bleed a cow with milk fever, but they all now condemned it, but if the cow must die, there would be no harm in trying it. I took his fleam and bled the cow pretty thoroughly. One teat was entirely bound up. I whittled a little pine stick down round and small, and bored out that teat. It was perfectly dry. I did it carefully, and washed the cow's bag pretty thoroughly, or, rather, his man did, with flaxseed oil. The next morning, I went to see the cow again, and bled her a second time. That cow got well, and gives milk to-day out of every teat, and is a good cow; I don't know but as good a cow as she ever was. That was the result of that experiment.

Another man in my neighborhood had a sick cow that was similarly situated. She had just calved, and could not get up. I bled her, and, finding that her bag was swollen quite badly, rubbed her bag with oil, and she got well. We only rubbed it once I think. I attributed the cure to the bleeding. Mr. Keith, who pretends to be a cow doctor, and goes all around for ten or twelve miles, says he has practised bleeding for the past year for every cow, and has not lost one.

Mr. Boise, of Blandford. I object to boring out the teat. I have had a good deal of experience in raising heifers and in taking care of cows, nearly the whole of my life, and I go 'round some taking care of cows when they calve, &c. I have a remedy for caked bag which I use, and use extensively. It is well known to a good many horsemen that, if they have a horse which has had the horse distemper, or has been foundered a little, they use an oil that is called skunk's oil. This oil, applied to a cow's bag, penetrates it, and takes out the fever almost immediately. But I spoiled two good cows by boring out the teats, and I don't want to spoil any more.

Mr. Converse, of Palmer. Mr. Keith went to visit a heifer this fall. She was a very nice heifer, but they could not get any milk from her, and they concluded she must be spoiled. He bored out all four of the teats. They thought there was no hole in the teats. Now she is a good heifer. You could not buy her for fifty dollars.

Mr. Boise. For the milk fever, I have used a poultice of mustard and vinegar, applied to the back. I believe the disease is something like the typhoid fever in the human system, and that either goes to the bowels, the spine, or the brain. I apply this poultice of mustard and vinegar to the spine, and right them in that way, without bleeding them at all.

Mr. Goodman. When such eminent doctors disagree, it is very difficult to decide in regard to the treatment of cows. I confess that I am rather a homœopathist; I don't believe in the heroic treatment, except in very extreme cases. It may be necessary, occasionally, to have the Cæsarian operation performed upon a cow, but I think as a general thing, that necessity may be avoided, by proper treatment of the animals. That is where the difficulty comes in. If our women, and our

cows also, were treated in a proper manner, if they had proper diet and proper exercise, and the other attentions that they require, parturition would not be such a difficult matter; we should have fewer diseases of women, fewer diseases of cows, better calves, and better children.

Now, as to garget, it has got to be a very common complaint, and I am not entirely certain that it is not contagious. I am not entirely certain but that, like the *epizoötic aphtha*, or foot and mouth disease, it may run through a herd sometimes, and of course it would attack the cows, which are more naturally exposed to it. We very often find that it comes in a peculiar manner to our cows, sometimes running through the herd. A few years ago I had a herd of good healthy cows, not subject at all to disease, but I was unfortunate enough to buy an animal that I knew nothing about, and I found that she was full of garget; her bag was as hard, almost, as a paving stone. I paid a pretty high price for the cow, but all the advantage I derived from her was what I got in the way of the exercise she gave my man in rubbing her bag for a year. But from that cow, the garget extended all through my stables. I studied up the books pretty thoroughly, and I resorted to a cow doctor, and after hearing what he had to say, and what remedies he thought I wanted to use, I came to the conclusion I had better leave him alone. Then I applied the rubbing system, which has been mentioned by my friend from Barre (Mr. Ellsworth), and I have never had any trouble, with proper attention, in reducing the inflammation. I know there are cases where it has been neglected, where medical remedies have to be applied. There are remedies in the books, which are complicated, and require a good deal of skill in administering them, but they must sometimes be resorted to. As a general thing, however, I think we shall do better by rubbing them with warm water and milk; I use that a good deal; but after all, it is the hand working that does the business. There is a doctor in New York who has effected some wonderful cures in this way. It is a pretty well established fact, that he has restored the eyesight and hearing of people by hand rubbing. There is no doubt that the great virtue of this method is in the constant irritation of the skin, and in the exercise that the muscles get in this way, bringing them round into a sound condition.

There is another point in connection with this matter to which I will refer for a moment. I think that animals, as well as men, are fed too often. That is, we eat too many times a day. There are exceptional cases; you cannot lay down a universal rule. A man who gets up at four o'clock in the morning and goes to work, of course needs three meals, because he has a long day; but take an ordinary Christian, who gets up in the morning at a decent hour, does his work faithfully, and goes to bed at the proper time, he will get along very comfortably with two meals a day; if he does not work any harder than a great many of the farmers in this State, he will do very well with two meals a day. The man who gets his breakfast at eight o'clock, and has a good digestion, if he will take his second meal at two or three o'clock, and not eat anything after that, and go to bed at a reasonable hour, will be a better man, will have a better temper, and his family will be happier, than if he eats three meals a day. It is the third meal that does the business, but we cannot get along without it, we think, in Yankee land.

In the old country, where they live upon solid food, and do not poison themselves with coffee and pastry, and rarely taste of sweet things, they have sweet tempers. But you know, that if you go among country people, they are so hospitable that they will give you for supper hot biscuit, half a dozen kinds of cake, a great many kinds of sweetmeats, some tongue, a little cold pork, and very strong tea and coffee. No man can go to bed on a supper like that, and wake up the next morning feeling comfortable and at peace with himself and all the rest of mankind. That is the sort of philosophy we ought to practise towards our animals. Up in Worcester County, where they are devoted to three meals a day, there are a great many farmers who feed their animals four or five times a day; but I found in some of the dairy sections of New York, where they have as good farmers as there are in Worcester County or anywhere else, they were in the habit of feeding their cows but twice a day. It looked to me at the time as rather preposterous, but I tried it all last winter upon my horses, and for two winters past I have tried it upon my cows, and I have not seen but that they got along just as comfortably, and they have eaten up their hay and meal cleaner, and have not eaten quite as much as when I fed them three meals a day.

My case is a little exceptional. My animals are breeding animals. I do not expect to get very much profit in the way of milk or butter. If I were running my cows for milk or butter, as a great many farmers do, and wanted to produce a large quantity of milk, I should perhaps feed them oftener and give them more; but, taking cows as they are ordinarily kept, we get through with them about November or December, and then the only point is to take care of them until they come in in the spring, and I think they would do just as well if they had but two meals a day,—giving them regularly what they want, and letting them lie quiet the rest of the time. Then, if we are careful about keeping them clean, and feeding them regularly, not over-feeding, I do not believe we shall have any trouble from garget.

I apprehend that whatever may be said of the influence of this Board, in other directions,—and it has been very extensive in many ways,—it will be admitted that its efforts for the improvement of the bovine species have been eminently successful. If there is one thing that can be pointed to as having vindicated the wisdom of those men who are called scientific farmers, it is the increased care which, during the last fifteen years, has been bestowed on the stock of the State. Any man who has paid any attention to that subject, who will look back during that period, will recollect that there were but very few parts of the State where he could find thoroughbred animals. Our ancestors may have had as good stock as was ever put upon any country,—our native stock, a conglomeration of all the breeds of Europe. Yet by want of proper care and proper feeding and attention, and, above all, by the use of what were called scrub bulls, we had so reduced the quality of our stock, that it had become decidedly inferior. But some gentlemen took hold of that matter, and imported thoroughbred male animals, and from that time to this, our stock has been steadily improving in quality; and although it is said statistics show that the number of animals is not so large as it was some years ago, yet that reduction in quantity is made up by the improvement in quality; we have such far superior animals that we do not want so many of them. Farmers in my region, who formerly found it necessary to keep a dozen or fifteen animals for the production of the milk and butter they wanted, now get along with seven or

eight, which, through their superior quality, and through the better attention that is paid to them, will produce as much as a dozen formerly did. And this State Board have gone so far, in obedience to the wishes, I am happy to say, of a majority of the farmers of this Commonwealth, as to pass a resolution last year, that hereafter no society sending a delegate shall give a premium to a bull that is not pure bred. Some farmers complain of this; but they are not prevented from raising a scrub bull and using it for beef, if they please. All that is said is, that those animals shall not be brought up and receive premiums equal to a thoroughbred, and for this reason: because every one knows that according to the laws of breeding, which have been laid down by Mr. Flint, and other gentlemen who have investigated this subject, a thoroughbred animal will produce a good progeny, while the stock of one which is not a thoroughbred, although you might get at first a good-looking animal, will run out, if you continue to use him. Therefore, I think it is the unanimous wish of all the farmers of this Commonwealth, who understand this subject, that we shall only give prizes to thoroughbred bulls.

Now, farmers are disposed, sometimes, to doubt on this point, and they say it is no object to look back to the pedigree of an animal, but they do not doubt when they look at the human family. Does not every man expect to find the likeness of father or mother in the child? Why, a man would have doubts about the paternity of his child if he did not see in him some likeness to himself. Do you find any old family in the world that has not stamped its features, in some shape, upon its descendants? Take the case of Henry the Eighth of England—a man of the strongest and most vigorous powers—a man who first married a woman like himself in character, Catherine of Arragon, whom he afterwards divorced. The result of that union—because "like produces like"—was the woman called "Bloody Mary." She inherited the strong qualities of her father, and she inherited the pertinacity of her mother. The result was, that notwithstanding all the adversities through which she passed, and all the humiliations to which she was subjected, she came out, when she was queen, just the same character that was to be expected from her pa-

rentage. After his divorce, the king married Anne Boleyn, and the fruit of that union was Queen Elizabeth, who exhibited the characters of both parents—the strong father, the weak mother. She was, in some points, one of the strongest persons that ever sat upon a throne; there came out, whenever occasion required it, the great character of the father, and she was equal to every emergency. But until that emergency arose, she had the weakness of her mother, and allowed herself to be toadied and flattered, and showed herself, what she really was in those moments, a weak woman. So you may take any of the reigning families of Europe, and you will see among them all the peculiarities of their ancestors, so marked that they could not fail to be distinguished by anybody who investigated the subject.

Now, we cannot ignore these same laws in relation to our stock. We cannot say that the best pure-blood bull does not perpetuate in his descendants his characteristics, either for good or evil. It is impossible for an animal that has not good qualities to give to its descendants characteristics which it has not. Therefore, as Mr. Flint has shown us, it is important that we should have, in a bull particularly, strongly-marked characteristics, because he gives to his progeny, through successive generations, his character, while the female only gives it to her immediate descendants. But I think Mr. Flint will agree with me, and all breeders, that it is better to have the very best cow you can get, and the best bull to match the cow, if you want the best stock. The only way, therefore, to bring up our stock, is as the best farmers are bringing them up. If we do not have thoroughbred stock on both sides, as is not necessary in the ordinary business of a farmer, we must make a selection of our best cows, and put them to the best thoroughbred bull we can find, and follow that up with the progeny. It is not a certain thing, because you have a first-rate cow, apparently, and a thoroughbred bull, that you will get a first-rate calf, because there are so many chances that a bad trait or a chance peculiarity will come out in the progeny, just as some peculiarity will appear in the children of a family for three or four generations. But if you continue this system, getting rid of your bad animals, if you have them, and taking the best to

breed from to keep up your stock, you will in time have the animals you ought to have.

The great trouble is, we do not give these matters the consideration and study we should. We come here and listen to these lectures and discussions, we get pretty full of them, we enjoy them, and then we go home, and when the reports come, we do not study them as we ought to do. Take that lecture of Dr. Nichols, or the one to which we have just listened by Mr. Flint,—it was pleasant to hear them, and we think we know all about them; but every sentence is just as full of meat as a chestnut is of its kernel, and a man needs to take these reports and study them out for himself, and think them out. That is the only way in which he can get all the benefit of these meetings. What we hear here comes in one ear and goes out at the other, except some few things that appertain to our particular calling; but these reports contain a mine of information and learning, and if, when we get them, instead of putting them on the shelves, to see how nice and clean the books look, we will take them up and read them, we shall be the wiser for it, and the men who come here in after years will be able to go forward to new fields of study and investigation.

Mr. Wetherell, of Boston, referred to the fact that the average yield of cheese per cow in this Commonwealth appeared, from the reports of the cheese factories, to be not more than 350 pounds, while in Herkimer County, N. Y., he had been assured by a dairyman of long experience, that he had cows that would produce 800 pounds of cheese. He thought the amount of milk per cow would not average over 500 gallons, and the amount of butter not more than 150 pounds. He argued from these facts the importance of paying more attention to the raising of good cows.

Mr. Ellsworth, of Barre, said that the cheese factories in his section of the State did not run more than five months in a year, and some of them only three. Their cows produced a large amount of milk after the factories stopped. Some of the farmers made butter, some sent their milk to the condensing factory, and others sent it to Boston, so that the reports of the cheese factories afforded no data whatever by which to arrive at the production of milk in that county.

The CHAIRMAN. This subject of breeding is one of the very highest importance. You remember that a great deal of excitement was created, a few years ago, when Mr. Campbell, of Vermont, went to the World's Fair with his sheep and took the first premium. It appeared, on subsequent inquiry, that it was but the imported blood of ten years previous that had gone back to Europe in competition with the French Merinos, the first in the world. It was the result of that careful breeding and feeding which have been referred to here.

Mr. HUBBARD, of Brimfield. With regard to the improvement of stock, I think there is no person who has travelled over the State and visited the various agricultural societies, who will not say at once that the stock in Massachusetts has been improved over what it was in former years. Now the question comes, "In what manner has it been improved?" We all say, "By the introduction of thoroughbred stock."

One word with regard to the milk and cheese produced in Massachusetts. I have about as much to do as any one with making up the reports to which reference has been made, and if we take the statements of those reports, we do not get a fair statement of the products of the cows of this State. There are some dairies which carry milk to the factory only during the excessively hot weather of July and August, and sometimes only from the middle of July until the first of September; but those cows are included in the number of cows on which the calculation is made, bringing the average per cow down lower than it would otherwise be. Then most people feed their calves, which are worth from five to twenty-five dollars, which is a large item to be added to the income of a cow.

Now, none of the factories very near me have run, for the last two years, more than three or four months a year. The dairies, in that section, previous to the factories' starting, are making butter and selling milk. The factory with which I am connected, started about the first of April this year. Previous to the first of April, the calves from the cows of the dairies were feeding, and the milk before that time was used in the manufacture of butter. The factory (and mine is only a sample of others) closed its operations in making cheese in October, and from that time forth, the milk in that section was carried to the condensing factory in West Brookfield. There is a large item of

income that comes from the dairies after they are through with making cheese. Then, again, there is a milk car that runs through to Boston, on the Boston and Albany road, and, for several months after we get through making cheese, a good deal of milk is sent to the Boston market. Now to get at the real profit of our cows, we must take the entire income, not merely what we receive in a short time.

Adjourned to half-past one o'clock.

Afternoon Session.

On the reassembling of the Convention, the Chair stated that the subject for discussion was

FRUIT CULTURE,

which was opened by J. F. C. Hyde, of Newton. He said:—

The subject presented for discussion at this time is old and familiar and yet always an interesting one. It may be asked, what we have to offer that is new. Possibly not much, but we believe that good always comes from the free discussion of 'most any subject. What we have to say on this occasion will have particular reference to fruit-growing in our own State. The time was when some fruits were grown more easily than they now are. Our climate seems to have changed in some respects, rendering successful fruit-growing more difficult, while we have many more insect enemies to contend with, so that the chances of success are not so good as formerly. Apples could once be grown with as much ease and certainty as potatoes or Indian corn, while the crop is now considered somewhat uncertain, and by many as unprofitable.

No fruit grown in our climate enters so largely into our cookery, or is more highly esteemed for all purposes than this, and we feel that we cannot possibly do without it, but we shall certainly be obliged to do so if we depend solely on the crop produced within our own limits. Is the limited supply due wholly to the seasons, or is it true proper attention has not been given to the selection of varieties that would bear the odd years when the Baldwin does not, or to the neglect to plant apple-trees, and to take care of those already planted, or all these causes combined?

All through this State the Baldwin apple has been planted to the exclusion of better and annually producing sorts. During a bearing year, which is the even year, there are as many apples, and perhaps more than are wanted to supply the market, and the prices are consequently low,—too low the grower will say, and barrels to put them in too high in price,—so by the time the fruit is sold and all expenses paid, little real profit remains.

At just what price good apples grown in Massachusetts, properly picked and packed can be put down in our large cities so as to pay a fair profit to the grower we cannot exactly tell, but think it should not be placed below two and a half dollars, and possibly three dollars would not be considered too high a figure. They average the latter price, if not more, taking ten years together, for good apples never sell below one dollar and a half, and some seasons sell for four and a half to six dollars per barrel. We are told by some that apples cannot be raised at all here, but this we think is a mistake, for we have never known a season when some varieties did not give a fair crop in some localities.

Others say they certainly cannot be raised where land is worth several hundred dollars per acre; and to this we are agreed, and we would not advise the planting of apple-trees on valuable land near cities and large towns, when the same can be profitably employed for market gardening.

New York, Michigan and other States west of us yearly take from our pockets large sums of money that might just as well remain at home.

There are tens of thousands of acres of land eminently adapted to profitable apple culture that now are used as pasture or woodland. Who will say the hills of old Berkshire will not yield just as good apples as can be raised across the line that divides us from New York? Who will deny that there are many acres of land that are not worth more than ten, twenty or possibly fifty dollars per acre for any other purpose that could be profitably employed in raising apples? We fully believe if the farmers of our State would take good care in the selection of a site and of trees of good varieties for their orchards, and then take as good care of them after they are set as they do of other crops, there would be no complaint that the apple crop had ceased to be a profitable one. With the

constantly improving facilities for getting the fruit to market, even from the more distant parts of the State, let the farmer take courage and plant apple-trees even though he may not live to gather the harvests. Such orchards judiciously planted, and in such locations as we have suggested well cared for, we believe will prove a profitable investment in spite of all the obstacles that lie in the way. We have enemies to contend with, plant what crop we will.

We cannot be sure of perfect success in any department. We wish to remark, as we leave this branch of the subject, that more care should be exercised in the selection of varieties, so that the crop will be more uniform, and thus if possible avoid extreme prices. As we remember the many acres of land from which the wood has been stripped and that are now comparatively unproductive, let us hope these may be covered with flourishing orchards of apple-trees, whose boughs shall bend beneath their load of red and golden fruit.

PEAR CULTURE.

On the subject of pear culture we have little to offer. A great many trees have been planted during the past twenty years that are now coming into bearing, and the markets are likely to be well supplied with this excellent fruit. After long experience and careful observation we are led to believe that a pear orchard planted on suitable land and well cared for will prove a fair investment. The money will pay for a term of years—say thirty to fifty, the life-time of the trees—seven to ten per centum.

Once we thought pear culture even more profitable. Only the very best fruit brings a high price, and the very poor is wholly lost, as poor pears are not salable. We would not discourage the planting of pear-trees. Let every owner of a garden plant for his own use, if no more. If one has a soil or location or both peculiarly adapted to this fruit and can afford to wait, then plant pear-trees.

In planting orchards we do not advise the setting of many varieties; six to ten is all any person should set who intends to grow them for profit, and leave the planting of hundreds of varieties to pomologists, who wish to try all that are originated.

Several things are to be considered in the selection of varieties. One may raise those for home use that he would not grow for the market. Size, color, productiveness, quality, vigor and health of tree, are among the points to be considered in the making up of a list.

The pear-tree needs and must have higher culture and more care than the apple-tree, and especially those grown on quince stocks, the latter a class of trees we do not highly esteem. As this fruit is not used very much for cooking it is not so universally esteemed as the apple. We believe that our people make a mistake in not cooking the pear more generally, and so make use of even those specimens that will not bring the highest price in the market.

The pear-tree seems to have fewer insect enemies than the apple, though we cannot tell what time may develop. We still think pear culture should be encouraged.

We leave this subject, and briefly refer to that most luscious fruit, the peach. The peach in our boyhood days seldom failed, but within a few years has proved very uncertain. The trees under the management they have received have proved to be very short lived. This difficulty can be overcome in a great degree by the selection of pits from the best and most hardy varieties, and by growing the trees slowly and thus securing well ripened wood and greater duration.

The peach deserves more attention than it is now receiving in our State.

The cherry has not been regarded as a profitable fruit for several years, though when it is obtained it brings good prices. We cannot advise the planting of large orchards of this fruit.

The plum, never so healthful a fruit as some others, has ceased to be profitable, owing to warts and curculios, and very little attention is now bestowed upon it.

We pass to a brief consideration of the small fruits. Until within a year or two we have always advocated the extensive planting of the currant, both for home use and the market. The fruit is always agreeable, and finds a ready sale at fair prices. A formidable insect enemy has appeared, however, which will greatly discourage the growers of this healthful fruit. It was hoped that before this some effectual preventive of the ravages of the currant worm would be discovered. Powdered

hellebore, carbonate of lime, air-slacked lime and other substances have been used with considerable success, but still the detested worm continues its ravages to a great extent. We still hope and believe that this insect, like the equally detested canker-worm, will disappear soon and forever, and would advise the planting of currants. The only way we see is to keep on planting and fighting all enemies to the best of our ability.

Gooseberries have not been largely grown in our State, for the demand has never been very large. Our people seldom eat ripe gooseberries and the sale of green fruit is rather limited. We cannot advise the extensive planting of this fruit for profit.

The raspberry is an excellent fruit, that is highly appreciated by some and almost wholly neglected by others, and on the whole, does not we think receive the attention it deserves. It is true it is not of high flavor generally, but yet is a very pleasant fruit, and comes along at a good time, soon after the strawberry disappears. At the prices this fruit has sold for a few years past in Boston market, it must be a profitable crop. Good judgment should be exercised in the selection of a soil for this fruit, and it should have just the proper management in order to secure the best results. A mistake has been made by some in attempting to grow this fruit for too many years on the same spot. The plantation should be changed about once in four or five years; a moist rich soil is best adapted to the raspberry.

The blackberry is a most delicious and wholesome fruit, but difficult to grow. The plants are bad to cultivate among because of the thorns. They often winter kill, and the crop is by no means certain. We think there is little money in the blackberry. Let them be grown to some extent in gardens for home consumption, where they can be trained and well cared for.

What shall we say of grape culture?

After years of experience we say just as we have said of pear culture. Under favorable circumstances the crop is a profitable one. There are many choice locations, even in our State, where the grape could be made to flourish, and where a high degree of success could be attained. At how low a price per pound grapes can be grown and yet pay a profit we are not quite sure, though we venture to suggest the price of six cents, and that is a little lower than this fruit is generally sold. This year may possibly have been an exception. Sheltered hillsides with a

well drained and rather dry soil would be favorable to success. For a single variety to raise for the market we have found nothing to equal the Concord, though it is not a fruit of the highest quality.

Grapes require but little care and may be grown in the open field like hops, where nearly all the work of keeping the ground clean can be done by horse power. We have had uniformly good success in producing and ripening a crop, and regard grapes as more certain than most of the fruit crops.

We do not believe in the excessive pruning of our native rampant growers, that some have advocated. Those who will take the trouble to experiment in this direction will soon become satisfied that it is better to leave more wood. The demand for this fruit is increasing, and immense quantities are yearly placed in our markets from the West, so that were we not to raise a pound there would still be a good supply. Growers here have one advantage over their more distant neighbors, that of saving freight and possibly a commission. We still advise all who have a square rod of land to raise a few grapes for home consumption, and those who have choice locations peculiarly well adapted to this fruit, to plant largely of the Concord for the market.

We now come to speak of strawberries, one of the most profitable fruits grown. It may be safely said that the market is never glutted with good strawberries and probably never will be. They are such a universal favorite with all that they are all consumed, and at prices that afford a handsome margin of profit to the grower. This fruit requires a rich soil, plenty of manure and the best culture to yield the best results. It should be the object of every fruit raiser to produce superior fruit. Such will always find a ready sale at good prices. The soil should never be a very dry one, while a wet soil should be even more carefully avoided. The location should be such that no water will stand upon the bed during the winter, for it is almost sure to kill out the plants. Plants should be set in April or early in May; the earlier the better after the ground is in good condition. They may be grown in hills with good results, but we much prefer for a general crop to have them in beds. The plan adopted by our friends in Concord, which partakes of both hill and bed culture, is no doubt a good one. Some varieties make too

many runners, and the foliage is so dense as to seriously injure the crop.

If grown thinly they need to be mulched to keep the fruit clean. Chopped hay, straw or pine leaves are excellent for this purpose. The Belmont growers in years past have raised this fruit in great perfection in beds, and after securing one crop ploughed the plant under. This will do very well if the ground be weedy, but if not, the leaves should be mown off soon after the crop has matured, and the plants will come up with new life and vigor and give a large yield of fruit the next year. From a limited experience we are very much pleased with this mode of treatment. We hope to continue to hear favorable reports from our friend Moore of Concord, who has adopted a somewhat peculiar treatment of the strawberry, but which, among other peculiarities, embraces the mowing off of the plants. If we were to judge of his system by the fine specimens of fruit shown at the rooms of the Massachusetts Horticultural Society the past season, we should need no word of explanation or argument to prove its entire success.

Fruit should be sent to market in all cases with the hulls on, and if possible in baskets that furnish ventilation. He who grows for profit will select such varieties, without regard to quality for the table, as will give the largest number of quarts of fruit,—the Wilson, for instance. Size is an important quality in a strawberry, for everything else being equal the large fruit will always command a better price than the small. The fruit for market should not be left on until fully ripe, as it becomes too soft for transportation. For home use a very different selection of varieties should be made, and the fruit should be allowed to ripen well before picking. Weeds must be kept down, and it is almost useless to attempt to grow this crop unless clean culture is insisted upon. The plants should be covered on the approach of winter. Generally coarse horse manure is used for this purpose, but hay and even branches of evergreens answer a good purpose.

We would strongly encourage the more extensive cultivation of this most excellent fruit, believing that the demand will be even greater than the supply. The strawberry has fewer insect enemies than most other fruits, is as sure to give a crop as any,

is light and easy of transportation, with a sure and ready sale at fair prices. No more if so much can be said of other fruits.

We close by remarking that all things considered, we regard fruit growing as a profitable and pleasant branch of horticulture.

Mr. SLADE. What is the object of covering up strawberries?

Mr. HYDE. The object is to prevent them from freezing and thawing and being injured. No man knows better than yourself that it is not extreme cold that kills many things in our climate; it is the alternate freezing and thawing. For instance: I saw an English ivy here in town, which, wherever it is sheltered from the sun, stands very well; but wherever the sun strikes it, it scorches it like fire. It is not the heat: it is the freezing and thawing. This applies to the peach, to the althea and many other things. Whenever my strawberries have been left uncovered, they have presented a half-killed appearance; when they are properly covered, they come out as fresh and green as when the covering was put on them. And you will notice another thing: when there is a thaw in winter, you find that the ground under this protection, if the beds are properly covered, is perfectly frozen, while if you step anywhere else you may get into mud an inch or two deep; showing that the covering protects your strawberries from these alternations of heat and cold and keeps them in better condition.

QUESTION. Is there any remedy for that blight of the Wilson which prevails in your vicinity?

Mr. HYDE. That is a very singular trouble which affects the Wilson. We must have a better variety. I think our friend Moore has a seedling which will prove to be better. I hope he has. The Wilson is somewhat capricious. It works in this way: sometimes it will spread all over the ground and make more growth than you want and present none of that appearance to which I have referred. At other times it will stand still; throw off little offshoots, perhaps, and send out a runner or two, and remain in that way, and this blight will come out in spots over the leaves; and where that prevails to any considerable extent the crop will be pretty much a failure. I do not know of any remedy. I have seen it in Belmont, where the Wilson has received the very best cultivation, and I have seen

it in other places. I cannot account for it, and so far as I know there is no remedy for it.

QUESTION. At what time does it come on?

Mr. HYDE. It usually comes on before the ripening of the fruit and remains during the season. I have not noticed it particularly after the fruit is taken off, because the bed begins to grow brown after the fruit is taken off, any way.

Mulching is beneficial to all kinds of fruit, if you can afford it. I once mulched a pear orchard with meadow hay; it was somewhat expensive, but I have no doubt it was a good thing for the orchard. But there is one objection. Some object to shutting out the light and heat. That is the only objection I see to mulching. I do not think we can get such good pears or apples, in flavor, where the ground is covered. I do not think we can get our crop so forward where the trees are mulched in that way as where the sun's rays are allowed to strike upon the ground. But on dry soil that effect would not be seen so much as on more moist soil.

I believe in mulching strawberries for another reason: it will have a tendency to keep them clean. It is very disagreeable, after a rain, to find the berries ripe but with dirt scattered all over them. Pine leaves make a first-rate mulch. Cheap hay, straw, or anything of that kind answers a very excellent purpose. I would not use sawdust, nor would I recommend the use of tan. It brings with it a great many insects and causes the growth of fungi among the beds. I would recommend leaves of any kind. Some may ask the question why I do not cover with leaves. You are aware that in winter time it often happens that there is no snow on the ground, and then the high winds blow the leaves off; but something might be used to keep them down. I usually mulch just about the time the plants come into bloom; sometimes a little later, though I should prefer to do it before.

QUESTION. What is the best manure for the crop?

Mr. HYDE. I am free to answer that question. I am a great believer in well composted stable manure. I apply it to the extent of three or four hundred dollars to the acre. The heaviest application of manure I ever knew to be made was six hundred dollars' worth to the acre. The income from that acre was a little over a thousand dollars, after deducting com-

missions. There was a profit of $400 to cover merely the labor of picking and sending to market. That is pretty heavy manuring with manure at ten dollars a cord; but I believe in heavy manuring, as you can judge when I tell you that I put on my garden, where I raise potatoes and market stuff, twenty-five cords of stable manure to the acre. Some of my neighbors object to this heavy manuring. One man was cultivating three or four acres of strawberries and getting about half a crop. I said to him "Why don't you cultivate one acre and do it well?" He said, "What do you mean?" I replied, "Go to Belmont, where they get eight hundred, ten hundred, twelve hundred dollars from an acre, and they will tell you how to raise strawberries." He went there and became convinced that his shilly-shally mode did not pay.

In order to raise strawberries to a profit they should be highly manured. It is almost impossible to manure too highly for strawberries. That is, I would put in about all the manure I could, and mix it sufficiently with the soil, to have my plants thrive. It won't answer to put your plant into clear manure, of course, but you want to put as much into the ground as it will hold. Farmers understand how that is. I have had good success with wood ashes, but they are very difficult to get. I have used guano lately.

Question. How would you apply wood ashes?

Mr. Hyde. I would work them into the soil as I would horse-manure, and the next spring spread them on the surface, just as we apply guano. We use guano in the spring,—spread it over the beds; and it gives a healthy, dark appearance to the leaves, and I have no doubt it is a good thing to use. I have never been able to get unleached ashes enough to use in sufficient quantity to determine the best quantity per acre, but I can say as to guano. I apply a liberal dressing: I should think four or five hundred pounds to the acre. I do not rely upon that, but use it as an auxiliary. Having used my stable manure I use that to help start up my strawberries in the spring.

I have not found the best results from superphosphates, for the reason that I have not a great deal of confidence in commercial superphosphates. I think a great many of them are frauds. Right here let me say that I have used the superphosphate that Dr. Nichols spoke of yesterday. I don't want to

call names, for I don't wish to injure anybody; but I used that superphosphate, after as careful an examination as I could give it without analysis, side by side with horse-manure, to ascertain the results from so many dollars' worth of this superphosphate and so many dollars' worth of stable manure. It is sold for thirty or thirty-two dollars a ton, and I am free to say that I regard it as very dear manure for any crop. I should only use it when I could not get stable-manure.

QUESTION. How often do you put on the amount of manure you spoke of—twenty-five cords?

Mr. HYDE. Only once. For instance: we prepare our ground in the spring and the manure is applied. Of course the first year the plants cover the ground, and the next year we get a fine crop. When the second crop is off, about the first week in July, we turn them all over and put in another crop. We do not use that land again for strawberries for three or four years, because, with strawberries as with other crops, we must have rotation; and they do not do as well on the same soil again immediately.

As to apples, you know how Mr. Clapp of Dorchester has raised them in great abundance in a region perfectly infested with canker-worms. He has raised twelve hundred dollars worth of Gravenstein apples when all around him there was not an apple left. How did he do it? He put around his trees wooden troughs that he had made. He had one set that lasted ten years. They are wooden troughs cut out like a gutter, put around the tree and then a little roof put over it, the interstices being filled with oyster-shell lime or something of that kind, packed down firmly. Into these troughs he put crude petroleum. That had to be renewed once in a while, and once in a while the canker-worms were so numerous as to bridge it over, and a few might get on to the tree; but while everybody's trees in Dorchester (now Boston) were so infested by canker-worms that every green leaf was destroyed, his orchard has remained green and flourishing, and he has raised fruit right along. It is true, it is considerable trouble to do this, but it pays abundantly. Another man has preserved his orchard by the use of printer's ink, which is better than tar. His way of doing it is to put a strip of tarred paper around his trees (canvas would answer a better purpose), and over that spread

printer's ink. The only thing to be guarded against is that, unless you are very watchful, they will sometimes bridge the strip of paper and a few will get over. But if you are careful (and of course vigilance here, as elsewhere, is the price of safety), you may protect your trees in this way. You must look out that they do not get over in any large numbers. Apples can be grown in large quantities, in spite of canker-worms and all these other insects.

Mr. Moore. I will endeavor not to occupy much of your time, and will simply talk a few moments about some of the fruits.

I have been growing grapes for quite a number of years. I have now five acres. I find no difficulty in growing them. Of course, you must comply with the conditions named by friend Hyde. First, you must have a good soil and a good location. The soil to grow grapes in Massachusetts should be, of the two, rather light. That is, the grape wants a warm soil, and heavy soils are not generally warm. A southerly or south-easterly exposure is probably the best. Select a slight slope, where no water will stand, and where you will get more heat from the rays of the sun. In such a location as that, there cannot be any difficulty in growing grapes in Massachusetts; certainly, I do not have any trouble upon my land. I regard it as the surest crop of all the large fruits,—calling the berries the smaller fruits. The grape is less troubled by insects than any other crop. The principal trouble you will have from insects will be from the rose-bug. That pest you can get under after a little while, by picking them off. They come into my field from the west side usually, with a warm wind. I generally pick them off of the first row, and they will trouble me for about a week. Years ago, I would pick off a bushel of them, but now I have got them under, so that I do not have much trouble with them.

Now, in regard to the planting and cultivation. The grape does not, in Massachusetts—the strong growing kinds at least—require a very rich soil. A soil that is sufficiently rich to grow forty bushels of corn to the acre, is rich enough to grow grapes like the Concord, the Diana, the Hartford, and the Rogers,—the Rogers being even a stronger grower than most of the other kinds. I have found it impossible to grow the Diana

upon rich soil; it made so much wood that it does not mature; even if I laid it down, it would not fruit; whereas, upon poor soil, I have no difficulty.

I plant my vines ten feet apart one way, and seven feet the other. The reason why I do not have them the same distance apart each way is, that I may go through one way with a horse and cart, if I see fit. I do not think it is desirable, here in Massachusetts, to plough exceedingly deep. I am satisfied that ploughing fifteen or eighteen inches deep makes the crop later. I may be wrong about it, but I think I am correct there.

In regard to pruning, any system, no matter what it is, or no system, that will keep your trellis or your poles on which the vines grow, full of short-jointed, well-ripened wood, will give you a crop; and no matter how they are handled, you will get two or three crops. The difficulty comes after you have taken off three or four crops of grapes. Then, when the wood has become old and a little crabbed, and runs into a good many shoots, you will find more difficulty, if you do not exercise a little more judgment than perhaps some use. You will want to cut out some of that old wood, and get new wood in its place. New wood, short-jointed, well-developed buds, will give you a good crop. Your next year' crop depends upon the wood you grow this year.

Perhaps I need not say anything more about grapes, unless it may be about varieties. I buy every new thing that comes up, and get humbugged generally; but then, I rather enjoy it. I have found the Concord almost the only grape that pays me a profit; perhaps I ought to mention also the Hartford. I realized from a very small piece of Hartfords that I had this year, which came earlier than the others, more profit than I did from my Concords, getting about fourteen cents a pound for two tons which I had. Now, we do not have to take the trouble with our grapes at Concord that the western folks do. We take our bushel boxes into the field, pack them full of grapes, load them into the wagon in the field, send them to Boston, and sell them by the box for what we can get; we do not have to pay anything to the commission merchant, but take all the money there is in it, weighing the boxes before they are put up, and changing boxes with the buyers. This makes a very simple thing of it, and one quite readily done.

Perhaps you may think I state it rather strongly, but I believe I can raise a bushel of grapes as cheaply as I can a bushel of potatoes: I have no doubt about it. In the first place, it is no drain upon the farm for manure, after the first start. I have two acres back of my house on the hill, which some gentlemen here have seen, which was an old pine plain when I was a boy. Ten years ago, the land would not have brought ten dollars an acre, after the wood was off, and it had run up to birches and a few sapling pines. I cut off the trees and planted that piece with grapes, without the addition, mind you, of any manure at all. I have never put any manure there since, and yet I get all the growth I want. I would not have you understand by that that it is not necessary to manure grapes: I think it is often necessary to do it; but while I can grow all the wood I want, why should I manure? I cannot see any reason. When I begin to see the want of manure, then I am going to put it there; but while I can grow all the wood I want, and get all the fruit I want off of those vines, why should I put manure on? I might perhaps say further, that I have grown grapes to some extent, simply for the reason that they do not require manure. It is a constant drain upon the rest of the farm to raise any fruit that needs manure. As to the quantity of grapes which may be raised to the acre, I should say, without stating it high, that the grape runs all the way from two to five tons to the acre. I have seen at the rate of nearly ten tons to the acre raised, but from two to five tons I think would be reckoned a fair crop.

Question. What will they be worth?

Mr. Moore. You might just as well ask me what potatoes will be worth next year. It is a hard question to answer. This year, the price has been lower than ever before, and that not because of a surplus of grapes, but from the fact that there were spoiled grapes in some locations, and those spoiled grapes were put into the market, and the market broke down. Every farmer knows that if the market once breaks down, it is pretty hard to get it up again that year; and more so with grapes than potatoes, because grapes are considered a luxury: buyers will continue to buy if they get good fruit, but let them get poor fruit, and they drop off, and the demand lessens. I have averaged seven or eight cents a pound—that is all. But

grapes can be raised for three cents a pound, and pay better than any crop you raise down here. Three cents a pound is a dollar and a half a bushel, and I think grapes can be grown as cheaply as potatoes; they certainly can with me.

Now, perhaps I have said enough about grapes, and as I shall be able to speak but a little while longer, I will say a few words in regard to strawberries.

I am growing strawberries quite extensively, and I regard them as a profitable crop, when properly managed. Without any particular preliminaries, I will say, that my usual method of planting is to plant them in rows, four feet apart, and twelve or fourteen inches apart in the rows. Whatever way I want to grow them, I make up my mind to have them in straight lines. If I am going to make a bed which is to remain three years, as it would be necessary to do with the Triomphe de Gand, the Agriculturist, or the Jucunda, for the reason that none of these large varieties can be grown to a full crop under what is called the matted-bed or Belmont system, it is the best way, because in single rows, with the runners cut off, they can be made to produce good crops.

The greatest success that I have realized in growing strawberries, has been from mowing off the tops. You will think that is a pretty rough operation, but I will venture to say that not once in twenty times can a man grow a second crop of strawberries, with any success, particularly under the matted-bed system, without mowing the tops. Immediately after you have taken of the crop, don't wait, but mow them all over. Don't have any nonsense about it, but mow them right down close to the ground, and then rake the leaves off clean. Suppose you are going to keep your bed over, it will not be half the work to weed that bed after it is mown, that it would have been if you had not mown it. Then with a horse and a small-sized plough, go through the paths and turn two small furrows together—in all a strip from thirteen to fifteen inches wide; then with a Hexamer-prong hoe level the furrows and gather any rubbish in small heaps, after which the bed should be loosened with a small-pronged hoe, and any white clover or grass rooted up. By doing this it will be much less work to finish the weeding, which should be done at once, and you will be astonished to see what a handsome bed of strawberries you

will have in a few weeks. I persuaded my friend Hyde to try the experiment, and I believe I heard him state at the Horticultural Rooms that he raised the best crop he ever grew.

In the discussions that we have had at the Horticultural Rooms, Prof. Russell asked his opinion of this practice of mowing the tops, by Mr. Strong. Well, the professor, who is very strong in his opinions, said, "In the first place, it is contrary to common sense, and contrary to nature. It is all wrong, there is no doubt about it; and don't any of you try it." That was pretty strong language, but I thought I would wait and see how he would come out before we got through. He said it wasn't scientific: that is another term used. In the discussion afterwards, I said simply this: that I had tried it for a series of years; it was not a theory, it was a fact; and the answer to his assertion that it was not scientific was this: "It is a fact, and if it does not accord with your science, I rather think your science has got the worst of it." Then I took the ground that it was scientific, and although I am not a scientific man, and do not pretend to be anything of the kind, I undertook to prove it in this way: first, that when fruit trees and plants have perfected their fruit, their leaves have performed their functions. Take the apple, the peach, or almost any other tree, the leaves fall before you get another crop of fruit. They have elaborated the sap, perfected the fruit and seed, which nature intended they should do, and they have got through with their business. Then, there is another thing in regard to strawberry plants, which is not generally understood,—that the roots are perennial, to a large extent. Those roots begin to die immediately after the fruit is produced, and during the season most of the old roots die, and new ones start out directly above the old ones. Those roots dying out, the leaves exhaust the plants, which the roots are in no condition to support. Now, by taking off those leaves, which have become useless and exhaust the plants, we simply aid nature, and thereby do a scientific thing. I know, therefore,—I do not guess about it, nor is it any nonsense or theory, but is a well established fact, —I have practised this method for many years. It has lately been practised by my neighbors with perfect success.

Question. You don't remove the leaves?

Mr. Moore. I rake off everything I can, at the start.

QUESTION. I have heard some strawberry growers say that liquid manure was the best for strawberries. What is your experience in regard to that?

Mr. MOORE. Liquid manure is used by exhibitors at horticultural exhibitions to some extent, to make large fruit, but it would not be convenient, perhaps, to use it on a large scale. I have used a cord of manure, which cost $20, from the pork slaughtering tanks,—where they steam the heads and waste pieces of the hogs, to get out the grease,—mixed with five cords of beach mud to the acre, and had as good success as I ever had on the light land I was telling about.

QUESTION. Do you ever use what is called night soil on strawberries?

Mr. MOORE. I have not, to any extent. I want to use a manure that will be lasting in the outset. I knew that this waste, having a large portion of bone in it, would be lasting. I use stable manure, but I want it decomposed; because, if you use barnyard manure in anything like a raw state, you are very likely to be troubled with grubs. I do not have any difficulty with grubs, on land that has been planted for some two years before setting out the strawberries.

Mr. Hyde has referred to the difficulty with the Wilson strawberry, in consequence of its not running. I do not have any trouble at all. I attribute that to the planting out of the strawberry. The strawberry should be planted as early as you can get your ground dry enough to plant. Some of my neighbors run a furrow along, and set the plants on the side of the furrow. I think that is a poor way. One objection is, that I want my rows straight. If there is anything I pride myself on, it is the straightness of my rows; nothing would annoy me more than to have crooked ones. Then, again, I can't afford it; it is not a profitable way of doing the work. I generally run a roller over the field, and lay down a line that will stretch clear across it, and open a furrow with the edge of a spade, four inches deep. I generally cut off the ends of the roots, and then set them against the smooth side of the furrow. I think a good deal of the trouble in raising strawberries comes from bad planting. You will find plenty of farmers, men who are so anxious to get along quick, and to save a little time, that they do it at the expense of a good deal of money in the

end. They will put a whole wad of roots in a bunch, and of course a large portion of those roots will rot, and the plant will stand still; it won't grow. No matter where I plant strawberries, if it is on nothing better than a gravelly hill, they always cover the ground the same year. On the hill to which I have referred, the vines planted last spring now cover the ground, and are a foot high. It is simply from being what I call well planted out, and the cultivation I give them. That is, I keep the ground stirred; I don't raise any weeds. I have raised just as good a crop of weeds as was ever raised in Bristol County, but on figuring it up, I made up my mind that it was about the poorest crop I ever raised.

Question. What is your experience with reference to planting in the fall?

Mr. Moore. I do not do that. I have planted some this fall; some new varieties. I have a passion for raising seedling strawberries and grapes, hoping to get something that will be pretty good. I think I have got it now. But I have raised a great many, with which I had no success.

Question. Why won't a furrow answer?

Mr. Moore. In the first place, you cannot get your rows so straight; and, in the second place, by the time you get your ground levelled, you have not gained anything in time.

The Chairman. The farmers in various parts of the Commonwealth have, in a degree, followed the suggestions of Dr. Loring. He has suggested that, instead of attempting to raise half a dozen crops, the culture of which they did not understand, they would make a specialty of certain things,—fruits or vegetables. I know that this recommendation has been followed in some parts of Eastern Massachusetts, and with good success. Dr. Loring is present, and I wish he might follow up some of the suggestions he has heretofore made, which have proved so important and so profitable to the farmers who have followed them.

Dr. Loring. It seems to me a little hazardous for me to undertake to discuss fruit culture, after the reputation I have secured in the Commonwealth as opposed to fruit growing. I have explained my position on the fodder-corn question, and now I rise for another explanation. I have never opposed fruit

growing at all, sir. I have said that I did not think the growing of apples in large quantities was a part of profitable agriculture in this Commonwealth; and when I assumed the ground to which you, sir, have alluded in calling me out, with regard to the adoption of specialties in farming, I rejected the growing of apples, because it seemed to me that that belonged so much to general farming that it did not come into that branch which was specially profitable, and which you could pursue here in Massachusetts with advantage.

Now, let me explain a little about my views, and about orcharding as conducted in the old-fashioned way. I agree, that there are certain localities on almost every farm upon which apples can be grown, to a certain amount, with some advantage,—ground that is not fit for the rapid growing of the heavy feeding crops. I mean by that, soil that is not too strong, has not too large an amount of either vegetable matter or clay in it. Soil of that character, it seems to me, is fit to grow apple-trees on. Shaley land, land around ledges, land in which there is a great deal of decomposed rock, and a great deal of mineral matter, and especially the soluble salts, I have seen used for the growing of orchards to great advantage, especially in these modern times, when the growing of an apple-tree is a very difficult thing. Now, wherever there is upon a farm a piece of ground of that description, I would not object at all to occupying it with some apple-trees; not that I think those trees are going to make the farmer's fortune, but because I think they are a useful adjunct to the farm. The apple is a healthful fruit, and whenever you can get a crop,—which you cannot always do, —it is a good fruit to have upon a place. But in regard to the profit of orchards, as formerly planted by our ancestors, I still have great doubt, and I think the doubts are well founded. I have discovered that, more than seventy-five years ago, the same doubts were raised in England, in regard to the profit of apple orchards. If you will look into Sir John Sinclair's "Code of Agriculture," you will find that the rents of orchard lands were lower than the rents of any other agricultural lands in the kingdom; and my own experience and observation have shown me that there was good reason for it.

I can illustrate by describing the condition of affairs that

existed on my own farm in 1856, when I took possession of it. That farm had been famous for its orchard. It was one of the early orchard farms in the State of Massachusetts, and the trees were all of rare quality. They were nearly all of them imported by an ancestor of mine from England, and were the choicest varieties then known in England; what are known as the "Garden apple"—I doubt if it is ever seen outside of Essex County—and the "Pickman Pippin," one of the finest apples for cooking in the world,—a large, handsome, yellow apple, with a blush on one side; its acid as keen and lively as the cranberry, and perhaps a little sharper. That apple was among those brought over, and the reputation of that orchard was abroad over all Eastern Massachusetts. All the connoisseurs and amateurs in the place went there to get the best apples to be found. That orchard was planted somewhere about the year 1810. It occupied the best land on that farm, right around the barns, which were large and ample. There was one barn capable of holding fifty or sixty cows, and the hay to feed them. Right round that barn, the warmest, the mellowest, the best drained, the finest land for all sorts of vegetables, especially for the growing of onions, was occupied by these orchards; and much of the best grass land of the farm, which is very fine indeed, was occupied in the same way. These trees had stood there nearly half a century when I took the place. For fifteen years after they were planted, I find no record of the produce from the trees; I would not expect any; but meanwhile it was necessary, in order that the trees might grow thriftily, that the land should be kept up, and the farmers who occupied the farm were deprived of the profit of getting their crops from the land immediately adjoining the barnyard, and subjected to the expense of hauling the manure over a mile to other fields, in order that these apple-trees might be kept in good condition. Then I find an entry in the record of a certain year, after this orchard was fifteen years old, that the tenants paid their rent—which I think was $1,200—from that orchard. It was considered a great feat on the part of the orchard, that it had paid the rent of the farm; but it was so rarely that it paid the rent of the farm, that they thought it a matter worthy of historical record. But only every other year, for the remaining years

until the trees began to decline, did that orchard yield anything which was considered worthy of record. Meanwhile, the trees were manured to a tremendous extent; an abundance of barn-yard manure, and a great quantity of night soil, were annually employed in keeping those trees in what was called a good growing condition. About the year 1835, the yield of that orchard was so great, that there were twenty-eight hundred barrels of apples barrelled on the farm, and innumerable heaps left to decay on the ground; but the price which the apples brought, upon which the expense of gathering and barrelling was laid out, was so low, that it was not considered, by any means, a profitable crop.

When I took the place, in 1856, the trees were all out of condition. They were enormous, as you may well suppose; they had grown as all apple-trees grow in very fertile soil which has received an abundance of manure. What was the first thing for me to do? I had been told by old Col. Pickering, who is the best agricultural authority in Essex County, that bone was the manure to restore apple-trees. I thought he knew all about farming, and I went to work. I cleared out all the dead wood and any limbs that seriously interfered with the rest of the tree; I had a good many of the trees grafted with the choicest fruit I could find; I had the soil all round the trees revived with lime, bones, and everything of that description; I spent a great deal of money on those old trees; I had a respect for them as ancestral trees, in the first place, and in the next place, I expected to make my fortune by renewing those old apple-trees. Well, they looked finely, for about three years; everybody driving by said, "A new man has got hold of this place, and he makes it shine." I thought so, too; and by-and-by, I got one crop of fair apples, but the old vitality was not there. The trees would blossom,—they tried hard; they did the best they could,—but the "Pickman Pippin" and the "Garden Apple" were small; they did not grow rapidly enough to keep away the insects that infested them, and they were late. The crop was never a good one, so that the people who used to come there to get their favorite apples, after seeing the orchard renewed, went away and said I was a humbug, and the apples too. That was the result of my

attempt to restore that respectable old orchard, and that is the history of the profit of that orchard, one of the finest ever planted in the State of Massachusetts. Now, do you wonder that I take a little exception to occupying such lands as those, right round the farm buildings, within two miles of as good a market as there is in this Commonwealth, with apple-trees that gave no fruit to speak of for fifteen years, and were old at fifty? And then the competition is with everybody else, who has just as good a chance as you have.

That is one thing. But there is another trouble. We are not only besieged with insects injurious to vegetation, but every man knows that it is the hardest work in the world to make an orchard bear. I have had a hundred men, if I had one, come to me and say, "When you come round our way, I wish you would come and see what a thrifty orchard I have got,—how well it makes wood; but not an apple can I get." I have no doubt there are a hundred, perhaps more, orchards in this State that are simply ornaments to the ground upon which they stand; why it is, I cannot tell. I have recommended root pruning, surface dressing with bones, keeping away the barnyard manure,—which will make wood but not fruit,—and all sorts of things of that description; but somehow or other, the cycle has come round in New England when the apple-tree does not do well on our soil, so that I have come to the conclusion that it is not profitable for the farmer to occupy good land, on which he can raise annual crops, with apples. I do not think it is worth while for him to occupy his time in fighting worms and insects, when he could be engaged in more profitable business. It is a good plan for him to plant an orchard large enough to supply him with what apples he wants for domestic consumption, and a little early fruit, which is handy to put into his wagon as he goes in to the market in the morning, but beyond that, I do not think it wise for him to go. The wholesale growing of apples is not, in my opinion, a profitable branch of agriculture in Massachusetts. When I remember that the West is pouring in an abundance of apples, of a satisfactory quality, brought by rail, which are sold at a very low price, it does not seem to me that the farmers of New England can profitably compete with them.

But the growing of small fruit, of every description, is another thing. Take the strawberry. Every man who has help or has a family, can find leisure moments when his help or his children can be profitably engaged in cleaning up a strawberry bed, taking care of it, and gathering the fruit for the market. So the suggestions of Mr. Moore, in regard to the cultivation of strawberries struck my ear very favorably, and I was exceedingly interested in them. I can add only one thing. He spoke about the manures for strawberries. I have never seen anything in my life that would make strawberry vines fruit so rapidly as ashes. If there is any gentleman in the room who has tried them and found any objection to them, I wish he would say so.

QUESTION. What time of the year would you apply them?

Dr. LORING. Early in the spring, on the surface. I never would put ashes underneath for any purpose.

QUESTION. Leached or unleached?

Dr. LORING. Either.

QUESTION. Upon what kind of soil?

Dr. LORING. I have never seen any soil which was good strawberry soil, upon which ashes would not have a good effect. I mean by good strawberry soil, a warm, not too heavy loam, for I do not believe in raising strawberries upon a piece of heavy clay land; they will not do well there, but they will do well upon a somewhat light and warm loam, and on such soil as that, I am sure that ashes applied to the surface will always work well. I do not believe at all in burying them beneath the surface of the earth. I think they need the influence of the atmosphere in order to bring out their fertilizing properties, and that they are dissolved by the influence of the air and the rain in such a way that their fertilizing properties are carried down to the rootlets of the plants with great activity.

Now another thing. All small plants require warmth, and that is the secret of what Mr. Moore said about the amount of fertilization that grape-vines require. I noticed he said, that if grape-vines bore well, made wood enough, and fruit enough without manure, it was best not to manure them. That is true enough; but still, the old-fashioned mode of burying bones and manure four or five feet deep for the supply of grape-vines was entirely erroneous, and for this reason: the roots of the

grape-vines were attracted down into a cold bed, which was utterly at variance with all the wants of the plant, and especially of the fruit. The grape belongs to a warm climate; always grows, in northern latitudes, in a warm spot. When our ancestors came here they found, as the old historian tells us, grapes that would rival the ancient grapes of Eschol. It was always in the warm, sheltered nooks and against the rocks that they found them. Now to attract the roots of any plant of that description down into the cold regions of the soil is entirely wrong, and no man can gainsay it. It is surface dressing, therefore, it is an abundance of ashes upon the surface, that is best adapted to increase the fruit-bearing of grape-vines. I think the same thing holds good in regard to the peach, and that if we will adopt the practice of surface dressing all the small fruits, and all those delicate fruits that we are beginning to grow, it will be of great advantage to us; not using the heavy, fatty, nitrogenous manures, but such manures as I have described, which are filled with soluble salts and phosphates. I think that rule will hold good with regard to a very large proportion of the fruits which we can now raise to a profit. That we can grow pears on quince stocks to a profit, I have no sort of doubt. It is a delicate, nice piece of business, it is a matter of horticulture, I know, but there are really few farms upon which a piece of land fit for that purpose cannot be found. The trees need protection; I do not think there is any delicate fruit in the world which will bear the colds of New England. So true is this, that the old New England St. Michael's pear, which, when it was in its glory, was not surpassed by any other variety,—I wish it would come back again!—will not grow at all unless trained as a wall fruit. I have seen it trained right against a wall, and a very curious thing about it was, that wherever a stem hung out, and a pear formed upon it, it was split and cracked under the influence of the wind. I think that peach and pear trees should be sheltered, and I think there is no farmer in the State, with a market open to him, who cannot afford to grow such fruits as I have spoken of. I have always said that they enter into the specialties of New England farming like the cranberry on Cape Cod, seeds in Essex County, tobacco in the Connecticut Valley, and just as the growing of vegetables

may be made a specialty on every piece of land near the great markets.

Mr. —— I wish to say a word in regard to the apple and peach. It is well known to every individual who has lived to the age that I have,—threescore years and ten and upwards,—that in old times, when the snow lay on the ground from the latter part of the fall even until into May, and sometimes until the latter part of May, especially around the walls, and in the orchards, that we had enormous crops of peaches and apples. The ground was generally frozen before it was entirely covered with snow, and the frost came out of the ground considerably later than it has in latter years. Our orchards, both apple and peach, never came into blossom until after the frost came out of the ground, consequently, it was later in the season before they put out for bearing. We never had much of any frost after they came out of blossom, and consequently there was nothing to kill the fruit. At the time of the great September gale, some fifty-four or fifty-five years ago, the trees were so heavily loaded with apples, that when they were blown off, they not only covered the ground, but laid piled on top of each other. If apple and peach trees could be kept back now as they were then, I have not the least doubt that they would be as profitable and fruitful now as they were then.

The experiment has been tried by some, I believe; I have heard of one man who had an orchard of some five hundred peach-trees, who became discouraged with it, on account of its not bearing. It would blossom very profusely and very early in the spring, but produce no fruit, and by-and-by he came to the conclusion that he would cut it down as perfectly worthless; but some time in the course of the winter, when the ground had become perfectly frozen and hard, he turned his sheep into it, and carried in a large quantity of what he called rubbish — straw, old stalks, &c.,—which covered the ground all over, and when it came spring, the trees did not blossom as usual; he thought he had killed his trees. He did not cut them down as he had intended, and when finally the frost came out of the ground, his peach orchard bloomed profusely and bore abundantly. I believe it would be just so now, provided the fruit-buds could be kept back. It is the late frosts which come in the spring of the year, which spoil the fruit, not while the

trees are in blossom, but after they have blossomed and the fruit has set. The frost comes and nips the fruit, and it drops off.

Now, the experiment can be easily tried, and at a trifling expense. After the ground is frozen hard, cover up a large circle around the tree, and keep the frost there as long as you can. Then let the tree come into blossom, and see if you do not have fruit.

Dr. DURFEE. I think I will say one word about the cultivation of pears. My friend Dr. Loring has referred to dwarf pears. I want to say, that I have purchased a great many pear-trees. I have more than five hundred now, and I don't think I have one that was grafted on the quince that can stand alone. I have therefore come to the conclusion that our soil, at least, is no place to put pears grafted on the quince. There is no root to it. I say to any one who desires to set out pear-trees, be sure to set out standards. Then I want to say again, be sure and know what you get when you set them out.

Dr. LORING. That is the hardest thing to do.

Dr. DURFEE. A few years ago, when riding on the Western road, with a company of agriculturists, I remarked to one sitting near me, "I want to get about a hundred of the best kinds of pears." Said he, "I can tell you where you can get something that you can depend on." I said, "I shall be happy to know; where is it?" The reply was, "Go to such a nursery-man, and tell him you want a hundred pear-trees of the best quality, and you will be sure to get them; I know you will." So I took the trouble to send my order to that party; he was a particular friend of mine; I had been very intimate with him, and I thought I should get a good lot of trees. The trees came to my place; they are now in bearing, and if I told the truth, I think I should have to say that there are not more than four varieties out of that hundred that are worth raising. What is the result? I have got to graft the whole of them; there is no other alternative; that is, all that have any roots, and can stand alone; some of them, we have had to stake up. I repeat, therefore, if any of you are disposed to set out pear-trees, be sure you get standards; and be sure you know what you get, — if you can. That is the great difficulty.

Now, as to the profit of pear-trees, I will state one instance, within the limits of this town. I have tried to encourage peo-

ple to raise pears, grapes, peaches, and all those good things. There is a farm lying within about four miles from here, where, a few years ago, the man who lived there set out a little pear orchard. He is dead and gone, but the property has come into the hands of his sons, and last year, they leased the whole farm to a gentleman across the river, and they fixed the rent of quite a large tract of land,—some of it pretty decent for cultivation, and a great deal of it costing more to cultivate than it is worth,—they fixed the rent of that land on the amount of pears that they had obtained from that place last year. That man paid his rent because he expected a great crop of pears this year, and he had a large quantity, but not so much, perhaps, as last year. I do not believe that farm could be let for more than one-third what it is, if it were not for that orchard.

Dr. LORING. Are those standards, and how old?

Dr. DURFEE. Yes, sir. I think they are all standards. I should think they were seven or eight years old, and they are growing finely. Some of them are twenty feet high.

QUESTION. What varieties?

Dr. DURFEE. I don't know the varieties, but he raised a great many varieties.

Now, my friend asks what varieties of peach-trees I would plant. I would get the white peach. I don't think the Crawfords fit to raise. I cannot raise good Crawford peaches under cover; it is impossible; they are sour and bitter. But get the "Early York" and you will get a first-rate peach. Get "George the Fourth," and you will get the best peach that I ever grew. The "President" is a most excellent fruit. The "Stump-the-World" is a good peach. There are but four or five kinds that I can think of that are worth raising; that is, that I want to raise.

I was very glad to hear the remark that was made in regard to putting into the borders of grapes large quantities of bones and dead animals, and burying them so deep in the ground that they will never be heard from afterwards, unless you dig them up. I have seen the folly of this practice, and I know that the roots of the grape will not go near where they are, because I have seen it. As my friend (Dr. Loring) says, if you want to enrich grape-vines, enrich them near the surface. I will mention a singular fact in regard to grape-vines. We plant

them inside and outside of our grapery—one inside and then one outside, alternately. A few weeks ago, I had occasion to remove the soil inside, and concluded it was better to take it out. I think we had enriched it as much inside as out, for the sake of nourishing the roots. But when we came to dig down, we did not find any root there; the truth was, the roots ran outside, the whole of them. I suppose they wanted to enjoy the sunshine; I don't know what else they were after.

These ideas have been thrown out, in order that if any of you are going into the business, you may know some simple things about it. I wish there were more here to take up the subject and discuss it. It is one of great interest. I think if any one would take it up and give his attention to it, he could accomplish a great deal. If you want to get peach-trees, the best way is to go to Long Island and buy them at the nursery, selecting those about a year from the bud, bring them home, set them out in pots, and then cut off the top.

Dr. Loring. What Dr. Durfee has said about dwarf pears is very interesting; but the plan has been adopted in Essex County, of setting dwarf and standard trees alternately. It is very difficult to make the trees stand up. It requires as much manure to grow dwarf pears as it does to raise a crop of mangold wurzels. They require a great deal of manure, but they mature early, come into bearing early, and they will really come into bearing and go out of existence before a standard will get ready to go to work. That is the advantage of trees on the quince stock.

The statement by Dr. Durfee, in reference to the roots of grape-vines coming out from under glass into the warm light, where the sun shone, is an interesting fact also. You may not all have heard of certain experiments that have been made with the glass of green-houses, grape-houses, &c. It is one of the most interesting of modern discoveries, if true. Gen. Pleasanton, of Philadelphia, tried the experiment of inserting, in every eighth row of panes in his hot-house, a blue pane of glass, the whole length, as I should judge, of his house; and he found that the effect of that blue light upon his vines was such that the grapes in the houses in which that glass was inserted matured many days earlier than where the blue glass was not inserted; that the growth of the vines was much greater, the

quality of the fruit better, the grape larger, and the crop earlier, by the introduction of this blue glass into his grape-houses. He explains the fact upon the theory that there is something in the blue glass which modifies, to a certain extent the sun's heat, and in that way makes it more advantageous to the growth of plants. He went on with some curious experiments. He took a litter of pigs, and put half of them into a green-house made in the usual form, with uncolored glass, and the other half of that litter of pigs he put into one of his green-houses where he had the colored glass, and the difference in the growth of those pigs was so great that in two months those under the blue glass had outstripped the others by more than twenty-five per cent. He then took a sickly bullcalf (I never saw a bullcalf that was not sickly in my life) and put him under the influence of the light through the blue panes of glass, and the effect was wonderful. He revived in a short time, began to grow, and in less than two months he was a new calf, regained his health and spirits and strength, and throve as well as any animal could.

Now, this is a thing worth considering. The experiment is to be tried in Salem. In a little grape-house that is being constructed there, blue glass is to be inserted, and I hope we shall have an opportunity to learn the result.

Dr. Durfee. Can you tell what effect it would have on a sickly child?

Dr. Loring. There it comes right home. If it is true that blue glass has such an effect upon vegetable and animal life, that is under our control, I should be in favor of having blue glass put into our windows. I have no doubt it would be useful. At any rate, I am willing to try it. What the effect of this blue shade is, I cannot say. I don't suppose it can be accounted for. I don't know how it was discovered, but there is the fact exactly. As Prof. Agassiz once said to me, "Science is nothing but deductions drawn from facts," and there are the facts. That is what Lord Bacon said, too, two hundred years ago.

The Chairman. Farmers, themselves, are oftentimes surprised at their own foolishness. After selecting, as Dr. Durfee says, with great care, the best fruits,—apples, pears, peaches, or whatever they may be,—they take but little pains in regard to the soil and location in which the trees are planted. In a

climate like that of New England, if the location is not such as to protect the trees during the gales and high winds of the spring months, there should be hedges planted to protect them. My little experience in my own section of the State has led me to believe that our orchards do not, as has been generally supposed, suffer from the north-east winds, but from the south-west winds which prevail at the time when our trees are in blow, and whip them almost to pieces. In very many cases, farmers have been led to believe that their fruit crop has suffered from the severity of the winter months, when it was really on account of these high winds which prevail when the trees are in blow. Those orchards in our section that are protected by what is called "the back-bone of the cape," facing the south-west, have proved fruitful and profitable, and I have seen other orchards surrounded by hedges that have done well. It seems to me, therefore, that while we exercise great care in selecting the best varieties of fruit, we should also be careful in the choice of location.

In most seasons there are apples enough in Brewster and Orleans, and that part of the county; there are in Barnstable very few apples. I will venture to say, that if there are crops anywhere in that section, the trees have been protected, for my own experience has led me to believe that it is only in that way that a crop of apples can be obtained.

Dr. DURFEE. I do not think it is any object for anybody to attempt to plant an apple orchard now. I am very much discouraged in regard to apples; I think it is next to impossible to raise a crop. I have enough slugs of the canker-worm lying on the ground in my garden, to eat the leaves of all the apple-trees in this city, if they were suffered to go up the trees. The number is perfectly incredible. When I say there are thousands, I do not exaggerate. I find them going all over the county, far and near. The few trees I have in my garden, I have tarred, and I supposed, up to last year, that I had conquered the worm. I did not have a very large number last year, but wherever they did light upon a tree, it was death to the crop; but this fall they have come in greater numbers than I have ever seen them before.

I think, if we are going to do anything to protect our trees, we must begin in time. I did not begin soon enough. I am

very sure, from the attention that my man in the garden has paid to them, that very few have been able to pass over the tarred paper that I have put around the trees. In a few instances, where the rain affected the tar so that it did not stick to them, they would get over it.

Mr. GOODMAN. I should take some exception to the remarks of Dr. Durfee, so far as our locality is concerned. It won't do to say that apples cannot be raised on account of the canker-worm. There are no canker-worms in the western part of the State. In that part of the State, there is a large quantity of land adapted to apple-trees, that cannot be used for anything else. Therefore, we find apples a good crop to raise, on land that is almost barren, or, from its exposed situation hardly adapted to farming purposes. We raise large crops of apples up there, and find them a valuable crop, and shall continue to raise them.

So it is with pears. There is no tree that is so much affected by the soil as the pear. You cannot raise pears on the sandy, gravelly soil of Connecticut; but take a soil with some clay in it, or a good loam, and pears will grow there. Although I agree that pears on quince stock are not so good as others, still, they are good. They were grown in that way among the ancients. The ancient Greeks always cultivated the pear in that way, and it was the only way they could do it. It grows much more rapidly on the quince stock than on the pear. The practice with us is, to grow dwarfs in between the standard trees, and the dwarfs die out before the others come into bearing, or, at any rate, soon after, and then the ground is cleared. I have some forty dwarf trees, and this year they have all borne profusely, so that I had to support the limbs. That land has been in pretty good condition, all the time. I always top-dress in the fall, and mulch to some extent, and those trees have borne fully for many years. But there are standards which are highly recommended for a great many purposes, particularly for coming into early bearing. We have the "Doyenne d'Eté," now recommended as the best early pear. The standard tree will come into bearing in four or five years. The only trouble with it is, it is a rapid grower and a heavy bearer, and wants pruning, and the land ought not to be highly cultivated. That

is followed by various other sorts, particularly the Seckel, the Bartlett and the Lawrence. Almost any farmer can have a crop, and there is no tree that requires less pains and attention. Good trees are to be got from good growers, and they are very cheap. The great trouble is, they are not planted with any care. Instead of there being a little hole dug with a spade, and the roots put in just as it happens, you want to make a hole large enough to spread the rootlets out in a proper way, and then the earth put in and carefully packed. A tree that is properly planted in that way, the ground having been previously prepared as it should be, is half grown; there is no difficulty about it. The dwarf trees, of course, require more manure than standard trees; but, after all, I lose more trees by having my ground too rich than I do from any other cause.

There is nothing that troubles the pear with us so much as the sap blight. It is a different thing from the insect blight. It comes because of the ground being rich, and the wood growing too heavily, and in the fall the sap is frozen, and the tree killed. I have lost, for several years past, a good tree almost every year in that way. Therefore I am particular not to manure my trees too highly. After giving my standards good cultivation for two or three years, to start them, I do not give them anything more. My dwarf trees, I generally dress every year, in the fall, and mulch them. I generally take pure coal ashes, and spread them about the roots of the tree, and then top-dress with ordinary manure, and spade in the spring.

Then there is another great difficulty with our trees. As I go through the country, and see how the farmers treat their trees, I don't wonder they do not grow. They set out their trees, and then raise grass and clover in the same field, and it is impossible for them to grow. The land should be ploughed and cultivated regularly for several years. In four or five years, after they get well grown, and the ground thoroughly cultivated, there is no necessity for having any crop upon it. After a few years' time, if you have nourished it enough, the land ought to be put down to grass, and allowed to lie for several years, before it is cultivated again.

I think the pear has not had so much attention paid to it as it should have had. It is a fruit every family likes, when they

can get it, and it is a fruit that now brings a good price in the market. I do not pretend to be a great fruit-grower, but I have found the pear one of the easiest things to raise, and it is the one that I have had the most success with. It now furnishes me, some seven or eight years after planting, a delicious crop, from August down to the present time; and they will run for a month or two longer.

There is one other thing to be said about the pear,—that it ripens best in the house. There is hardly a variety that can be ripened well upon the tree. The great advantage of this is, that you can pick them when they are comparatively green and hard. Take, for instance, the "Flemish Beauty"; that will bear picking earlier than almost any other. Put the fruit on your shelves, or into drawers, and it will ripen up beautifully, and have a fine flavor; and in that way, they ripen gradually, and continue along through several weeks; whereas, if they are left on the tree until they get dead ripe, as most people leave their pears, they all ripen at once, and there is a great loss.

Mr. Hubbard. With the address of this evening, the exercises of this convention will close. I wish to say, that it is customary for the Board to hold meetings in some part of the State once a year, for the interchange of ideas, and to stimulate to renewed energy all those interested in this great branch of industry. By invitation of one of your citizens, the Board have spent the last three days in this city, and before leaving it, I desire to offer this resolution:—

Resolved, That the thanks of the Board be tendered to the citizens of Fall River, and especially to Dr. Nathan Durfee, for their generosity, courtesy and hospitality to us on this occasion.

The resolution was passed unanimously.

Dr. Durfee. Permit me to say, sir, that the thanks of this community are due to the Board of Agriculture for the valuable and interesting information which has been imparted to them during the last three days. Especially, gentlemen of the Board, you have my thanks. I hope you will leave this place with the best wishes that our prosperity, of which you have had some evidence since you have been here, may be continued in the future.

The Board then adjourned.

Evening Session.

The Board met at 7½ P. M., to listen to the following lecture upon

WHAT MODERN SOCIETY OWES TO SCIENCE.

By Dr. George B. Loring.

Gentlemen: — The annual meeting of the Massachusetts Board of Agriculture, for public lectures and discussions, is now about to close. It has been a session of unusual interest to all who are interested in agriculture, illustrating the deep desire of those who pursue this calling in large measure or in small, to ascertain the best laws by which they can be guided. The inquiries and deliberations of this Board mean an attempt to introduce the best theory and practice into an occupation, which, while lying at the foundation of all industry, has too generally been conducted without well defined rules, and has puzzled the scientific investigator by its successful crudities, more than the deepest problems have by their intricacy. The success of agriculture hitherto has been owing more to the fidelity of nature, and to her ready response to every reasonable call, than to fixed principles and accurate systems. The strong arm, the steady head, and the industrious purpose have prevailed. But when the worn and weary student has left his closet for the field, carrying with him none of those instinctive faculties which are born and cultivated beneath the open sky, he has been doomed to disappointment. When Burke withdrew from his brilliant and dazzling career, in which he had astonished even the genius of his time, and had secured for himself an immortal name among the greatest, and had retired to his farm at Beaconsfield, he found his eye too dull, and his thought too vague, and his judgment too narrow, for the sudden and unexpected emergencies which met him every day and everywhere on his farm. The weapons which he had used in his contests with his fellow-men, were useless when brought into a struggle with those obstacles which attend the changing seasons, and all the various conditions of soil and climate. His statesmanship was a brilliant success, his farming was a painful failure. And from his day to our own the disciplined mind has looked with envy upon the success which has attended the exercise of keen and quick perception, unerring judgment,

readiness in emergency, and steady common sense in the practical duties of agriculture.

Now, it is to remove this trouble, and to give the weak a fair chance with the strong, that careful agricultural investigation, and the application of science to the business of farming, have been so earnestly urged and so liberally provided for in our day. I cannot tell precisely how much benefit is to be derived from our labors. But I am sure that we may here learn of each other the laws by which agriculture can be conducted, and the principles which we may profitably apply to the land, and to the care of our flocks and herds. And when I call to mind the sure prosperity, the domestic happiness, the social repose which gather round a rural home here in New England, or which God intended should gather round such a home, I cannot believe that the tastes acquired in this assembly will be wasted, or that the knowledge acquired here will be useless. To the substantial prosperity which agriculture, even in its rudest forms, has always presented, and to the comfort and happiness which have always been accorded to the farmer's home, and which some of us have found there, are now added the great results which science lays at the feet of this as she does of every other pursuit in life, in our day. The problem which the student of agriculture is called upon to solve is how far he can apply scientific rules to the economy of the farm, and how largely the general prosperity of an agricultural community can be increased by the introduction of intellectual training into this especial business of life. How this problem will be solved I have no doubt. And feeling as I do the great obligations we are under to the scientific mind of our day, I shall leave the path which you have trod so well in your discussions, and ask you to consider the mighty efforts which man has made to solve the mysteries of nature for his elevation and practical benefit, and to render it possible to establish this very State Board of Agriculture, which three centuries ago would have been an impossibility.

For the practical farmer, we have discussed the various modes of cultivation, the management of animals on our farms, the application of chemistry to the improvement of the soil, and the various methods by which the prosperity of the calling can be secured. The subjects of theoretical and practical agri-

culture seem to be exhausted, and I dare not venture upon either a repetition of what has been said here, or upon still further investigation upon matters which have been subjected to your own exhaustive inquiries, and so remembering that it was the establishment of a Board of Agriculture in England which first introduced scientific principles into the practice of farming, and gave Sir Humphrey Davy his first opportunity for useful service in this direction, I propose to lay before you the steps by which man has arrived at the possibility of this connection between science and the practical affairs of life. The way has not been easy. Three centuries ago the educated mind of the world had rejected the very foundations of such a connection; and it is a matter of special interest to us to know the process by which this scientific possibility has been reached. Now, the great feature of our day is, that everywhere in cultivated and civilized society may be found an intense and serious effort to infuse the accuracy of scientific investigation into all practical affairs, and into the broad foundations of the Church and the State. Turn your eyes in any direction, and you will find the most powerful human intellect engaged in this labor.

The scientific period has arrived. The profound and masterly minds of the age—Humboldt just now gone, Agassiz resting for an hour only, as we trust, to return with renewed vigor to his imperial career in the realms of science, and their great investigating fraternity on both continents—have placed science at last in the divine regions of human genius, once occupied by the poets and historians, and orators and philosophers, who so long enjoyed undisputed sway as masters of human thought. The prediction made by Dr. Young, in the latter part of the last century,—a prediction then, and a familiar reality now,—has been more than fulfilled. Remembering, as he did, that "the last two hundred years have done much more for the promotion of knowledge, than the two thousand years which preceded them," he says: "We have therefore the satisfaction of viewing the knowledge of nature not only in a state of advancement, but even advancing with increasing rapidity; and the universal diffusion of a taste for science appears to promise, that, as the number of its cultivators increases, new facts will be continually discovered, and those which are already known, will be better understood and more beneficially applied." And

he adds a word which I quote here for the encouragement of the Board of Agriculture, in that career of usefulness, which has thus far grown with its growth, and strengthened with its strength, and which may not pause until its cheering influence is felt throughout the entire domain of practical science. "The Royal Institution," he says, "with other societies of a similar nature, will have the merit of assisting in the dissemination of knowledge, and in the cultivation of a taste for its pursuit; and the advantages arising from the general introduction of philosophical studies, and from the adoption of the practical improvements depending on them, will amply repay the labors of those who have been active in the establishment and support of associations so truly laudable." Not, however, in the two centuries preceding this declaration, nor in the half century preceding, but in the short and eventful period which has followed, have the great achievements been made. The brilliant career of Buffon had just closed; but Laplace and Cuvier and Davy still lived and made promise of that wonderful march of science, which rose before the mind of Dr. Young, who might now be lost in admiration, before the imposing monument erected upon the foundations laid by his distinguished cotemporaries. For now it would not be the labors of the great alone which he would be called upon to admire, but that "deliberate and concurring judgment of common minds," as Lord Bacon calls it, which has made science familiar to us all, and has filled the highways and by-ways of society with its life-giving fruits, and the human mind with its invigorating modes of thought.

And, now, surrounded as we are by all the blessings which science can bestow, and by all the promises which its enthusiasm can make, we cannot and should not forget the severe and desperate struggles it has been obliged to make in its upward progress. The cruel agony and torture which have visited the religious reformer; the poverty and contempt and despair which have made death welcome to so many of the sons of genius, whose immortality is now man's great inheritance; the hard and unequal warfare maintained by those who have fought for human freedom and equality and right, are familiar to us all. But not one such trial alone, but all and more have fallen upon, and harassed and persecuted those who have endeavored, by scientific research, to ameliorate the condition of mankind,

and to "look through nature up to nature's God." It is indeed difficult for us to realize, that against the theory that the earth is a terraqueous sphere, the whole power of the Christian Church should have armed itself, as late as the sixth century; and that nothing but the fact of circumnavigation, centuries later, dispersed the ecclesiastical forces. We turn with shame from the ignominy heaped upon Copernicus while living, and the insults to his ashes when dead; from the imprisonment, and torture, and fiery death of Bruno; because they proclaimed the great scientific fact, that the earth and planets revolve about the sun. Our hearts are moved with indignation and sorrow as we behold Galileo, driven from the pale of Christianity, denounced, tormented, forced in his old age to "abjure, curse and detest the error and heresy of the movement of the earth" —because he had worn out his great life in studying the glories of the heavens which God had made, and had taught the world that, in obedience to the divine harmony which set the constellations in their places, the earth did move, with its starry companions, around a common centre. We can hardly believe that the first great anatomist was exiled by the lovers of "sound learning," in one of the most enlightened and pious courts of Europe; and we hasten to forget that in our own day, in the name of religion, the best geologists, men of exemplary lives and an abiding faith, have been denounced as infidels and atheists, for having opened that volume on whose stony pages are written the succeeding chapters of creation, and the great laws of an all-wise Creator.

But this severe struggle between science and religious dogmatism, that strong fortress, behind whose frowning bastions the most fervid religious faith is prone to seek shelter and protection, is small when compared with the long and bitter contest which attended its emancipation from the tyranny of intellectual arrogance and pride. Contrary to that modern theory of science which would dispense, with a large and liberal hand, the bounties of sound learning to all men, "for the relief of man's estate," the ancient philosophers assumed that the object of all learning was to elevate man above this sublunary sphere, and to fill his mind with a lofty indifference to all his wants and necessities and comforts. "Philosophy," said Seneca in reply to Posidonius, who inadvertently complimented science, for

having discovered the principles of the arch, and the proper use of metals in the arts, — "Philosophy teaches us to be independent of all material substances, of all mechanical contrivances. The wise man lives according to nature. Instead of attempting to add to the physical comforts of his species, he regrets that he was not cast in that golden age when the human race had no protection against the cold but the skins of wild beasts, no screen from the sun but a cavern. To impute to such a man any share in the invention or improvement of a plough, a ship, or a mill, is an insult. In my own time, there have been inventions of this sort, — transparent windows, tubes for diffusing warmth equally through all parts of a building, shorthand, which has been carried to such perfection that a writer can keep pace with the most rapid speaker. But the inventing of such things is drudgery for the lowest slaves; philosophy lies deeper. It is not her office to teach men how to use their hands. The object of her lessons is to form the soul: *Non est, inquam, instrumentorum ad usus necessarios opifex.*" "We shall next be told," exclaimed he, "that the first shoemaker was a philosopher." It has been well said that in the minds of such men as he: — "The business of a philosopher was to declaim in praise of poverty with two millions sterling out at usury; to meditate epigrammatic conceits about the evils of luxury, in gardens which moved the envy of sovereigns; to rant about liberty, while fawning on the insolent and pampered freedmen of a tyrant; to celebrate the divine beauty of virtue with the same pen which had just before written a defence of the murder of a mother by a son." But it was this style of thought and speculation which occupied the attention of the world for more than two thousand years. Socrates, Aristotle, Plato, Seneca, Cicero, all lived in an atmosphere of intellectual superiority, which enabled them to transmit to the student all the sublimity of thought, of which finite man is capable, all the moral elevation which the human heart can reach, all the religious confidence and trust which man can attain unaided by the light of revelation. It is not surprising that through so many ages they should have exercised supreme sovereignty in the kingdom of thought, and that great minds should have followed them, and little minds have been obedient to them. Nor, perhaps, is this a misfortune. For it were not easy to tell

the intellectual effort which they have inspired, nor to count the scholars they have created, nor to value too highly the assurance which they have given to mankind, that the monuments of genius shall not decay, even though material grandeur shall perish and be buried beneath accumulating dust. We are willing to walk hand in hand with them through those long ages, in the darkness of which their lights were not extinguished, and in the radiance of which it was their scholarship which prevailed. But we can imagine how our obligations to them would have been increased, had they and their followers substituted for wearying disputations, an encouraging word for natural philosophy as the foundation of useful discoveries, and not as a subject for fresh controversy and mere mental exercise. Nature and the generations of men can afford, I have no doubt, to wait for light; but still the hours are weary. And I know no story in all the history of man's intellectual endeavor, sadder than that of the one great scientist of the middle ages, who, blinded by the lustre of scholasticism, and bound hand and foot by the rigors of ecclesiasticism, struggled in vain to emancipate practical science, and left behind him his own hints as a guide, and his own failure as a warning to his great namesake, who, coming after him, fell on more fortunate times. We are told that when Roger Bacon in 1234, studied mathematics, physics, and astronomy, and impoverished himself and his friends in purchasing the most costly instruments of his times, experimental philosophy was little in vogue, and his researches excited the hostility of his fellows. He was a devoted student of Aristotle and all his commentators in every language; but he found it impossible to carry the teachings of this great philosopher into practical science, at a time when all science was considered no better than heresy, and its results no better than magic. His writings were condemned; in his old age he was imprisoned; and he died in neglect. He was the great anticipator of science and the scientific age, which dawned upon the world three centuries after his death. He conceived the discovery of the telescope, and knew the composition of gunpowder, but was not permitted to witness the glorious revelations of the one, nor the irresistible force of the other. With his mind filled with visions of scientific grandeur, he could get but little farther than to declare that the causes of the intellectual torpor and ignorance

of the era in which he lived, were too much blind confidence in authority, too much respect for custom, too much regard for popular prejudice, and too much conceited selfishness, which induces one to regard as dangerous and puerile whatever he does not know. But he "claimed for human reason the right to exercise a severe control over all the doctrines submitted to its approbation; he insists upon the dignity and the importance of the sciences, none of which are to be proscribed, and all of which are to be cultivated; and he establishes experience rather than reasoning as the proper method of research." And so this great man surrendered, leaving behind him only his appeal for intellectual progress, and preparing the way for a more defiant and revolutionary age of great discoveries, and popular assertion, and religious reform, and emancipated science. Three centuries passed away before his prophecies were fulfilled.

And now the great struggle commenced. Men still believed with Plato that science was a mere intellectual exercise and amusement; that the study of arithmetic was not intended for any practical service in life, but to habituate the mind to the contemplation of pure truth; that mathematics applied to any purpose of vulgar utility became a low craft, as he called it, fit only for carpenters and wheelwrights; and was no longer a noble science "leading men to the knowledge of abstract, essential, eternal truth; that the use of astronomy is not to add to the vulgar comforts of life, but to assist in raising the mind to the contemplation of things which are to be perceived by the pure intellect alone;" that the science of medicine should be applied only to those whose constitutions are good, and not to those who by inheritance, or excess, or exposure, or accident, have become so permanently enfeebled that their heads grow giddy and full when exerted in the studious contemplation of divine philosophy,— the remedy for feeble constitutions being death; that the science of legislation was based upon abstract virtue, and not upon that practical wisdom which would prevent and reform crime, and build up a state upon the principles of patriotism, and honesty, and courage, and honor, and furnish the highest faculties of man an opportunity to exert themselves "without being molested or insulted for it," as Gen. Grant said in his memorable conversation with Judge Hoar.

But this was not enough to satisfy the mind of Francis Bacon, who now assumed the leadership of the great scientific revolution, begun by him, and carried on in our day by the devotees of science everywhere. Entertaining profound respect and admiration for the great thinkers of ancient times, to whom I have alluded, and moving by his own natural forces along the same high plane of thought which they occupied, he stooped down and lifted into their august presence that useful and manly and homely attribute known as common sense. To be a philosopher meant with him to be the most useful man in the world; and so to him belongs the praise of having invented, methodized, and in a considerable degree perfected the general plan for the improvement of natural science by the only sure method of experiment. "Instead of hypotheses he asked for facts, gathered laboriously from the watch of nature's silent revolutions, or extorted skilfully by instruments and trials, and carried forward by careful generalizations from the world of the known to the unknown." He reasoned always from causes to effects; and so impatient was his mind of mere abstractions, that he never rested until he had brought his conclusions to some practical benefit. "He clearly, for instance, conceived of a thermometer; he instituted ingenious experiments on the compressibility of bodies, and on the density and weight of air; he suggested chemical processes; he suspected the law of universal attraction, afterwards demonstrated by Newton; he foresaw the true explication of the tides, and the cause of colors, which he ascribes to the manner in which bodies, owing to their different texture, reflect the rays of light." Ask a follower of Bacon, we are told, what the new philosophy as it was called in the time of Charles the Second, has effected for mankind, and his answer is ready: — "It has lengthened life; it has mitigated pain; it has extinguished diseases; it has increased the fertility of the soil; it has given new securities to the mariner; it has furnished new arms to the warrior; it has spanned great rivers and estuaries, with bridges of form unknown to our fathers; it has guided the thunderbolt innocuously from heaven to earth; it has lighted up the night with the splendor of the day; it has extended the range of human vision; it has multiplied the power of the human muscle; it has accelerated motion; it has annihilated distance; it has facilitated intercourse, correspond-

ence, all friendly offices, all despatch of business ; it has enabled man to descend to the depths of the sea, to soar into the air, to penetrate securely into the noxious recesses of the earth, to traverse the land in cars which whirl along without horses, and the ocean in ships which sail against the wind. These are but a part of its fruits, and of its first fruits. For it is a philosophy which never rests, which has never attained it, which is never perfect. Its law is progress. A point which yesterday was invisible is its goal to-day, and will be its starting-point to-morrow."

I have said that Lord Bacon endeavored to found his theory of philosophy on common sense ;—I think he established the process by which he could reach the highest philosophical truth, upon the principles of common honesty. He proposed no new method of reasoning. The danger and weakness of syllogism were discovered long before he was born ; the value of induction had been recognized by scholastic and scientist for centuries. But Bacon realized that a process of induction which failed to recognize all existing and possible facts, whether by accident or design, is as fatal to truth and sound philosophy as a syllogism which, unmindful of the fallacy of accidents, proves that we eat raw meat :—" we buy raw meat in the market ; what we buy in the market we eat : therefore we eat raw meat." He knew well that the inventor and discoverer who would arrive at any conclusion, valuable to himself and mankind, or the scientific explorer who would open new paths to useful knowledge, could not afford to shut his eyes to any facts or phenomena connected with the work upon which he was engaged. He felt that the recognition of error and failure is as important in all investigation as the recognition of truth. He turned the process of induction, therefore, from the scholastic business of making a good syllogism, perhaps of no value whatever, to the philosophical business of making a great discovery, or arriving at a great truth, invaluable to millions of the sons of men toiling to elevate themselves into the highest regions of civilization, with all their mortal necessities and their immortal aspirations. He was as impatient of fallacy, as he was of an accumulation of facts from which no principles could be deduced, and so he threw aside the books of the ancient schoolmen, because they taught nothing for the discovery of useful truth ; and he burnt

the books of the ancient farmers, because they laid down no laws, and could therefore be of no use to any man. How he would have rejoiced in Franklin who caught, and Morse who used the lightning; in Brancas who discovered the power of steam, and Watt and Fulton who applied it; in James Smith, of Deanston, who invented tile drainage, and in John Johnston, of New York, who has employed it in a successful warfare against drought and flood, and the wheat-midge; in Count Rumford, who, having made a profound study of the theory of heat, set himself at work inventing fire-places, and grates, and ovens, and cooking-ranges, and founded a professorship of the application of science to the art of living; in Agassiz, who, having studied botany with Martius, and the embryonic development of animals with Dollinger, and the principles of classification with Oken, and zoölogy with Cuvier, joined hands with the farmers of Massachusetts in their investigations of soils, and crops, and animals, and taught the fish commissioners of Massachusetts how to stock the lakes and rivers of that industrious and enterprising Commonwealth! What an admirable professor in a school of technology Bacon would have made! What an efficient and accomplished president of a model agricultural college!

When Lord Bacon introduced the demands of common sense, and the principles of common honesty, into philosophical reasoning and investigation, when the student of nature adopted the motto of "*Nullus in verba*," and listened only to the result of experiments, or to the unerring mathematical deduction from those results, then the temple of science was raised with rapidity and triumph, by the accumulation of facts upon facts, which were firmly cemented by the strictest reasoning. And then the emancipation of science was achieved, and that struggle began which, in various forms, has continued to this day. And what an era of emancipation was that in which Bacon wrought! Everywhere the bonds which had bound man's soul seemed to be breaking. Between the birth and death of Bacon, America opened her arms, to receive the oppressed and persecuted. The Huguenots brought their protesting faith to our southern shores. The Puritans, who had kindled and preserved the "precious spark of liberty" in England, having sought shelter in vain in the Old World, braved the dangers of

an almost unknown sea, defying with their fervid hearts the freezing storms of winter, and the still more freezing storms of man's bigotry and persecution, and planted popular right and independent Christian worship in the New World, and gave an immortal soul to the empire of human equality on this continent. In the world of thought Shakspeare performed his divine and undying work. In the world of science, Harvey discovered the circulation of the blood; Drebel invented the thermometer; Torricelli invented the barometer; and Kepler erected as a monument to his genius, the "*Astronomia nova celestis.*" It was the era of mental and moral protests and assertions, from which our own great privileges and opportunities have sprung.

From that period, the struggle which science had so long carried on against bigotry and intellectual arrogance, has been conducted, with a spirit of "audacity and sobriety" worthy of its great master, against the natural obstacles which lie in the way of finite man, in his endeavors to comprehend and employ the works of Infinite Wisdom. Once free, science has not been disheartened in her career of usefulness and honor. What an army of martyrs does she already present for the respect and admiration of mankind! Amidst the eternal snows of mountain heights, in the awful solitudes that surround the poles, in the smothering damps of unfathomable mines, scorched and stricken down on the burning sands of the desert, poisoned by miasmas, stifled by the fatal gases of the laboratory, wasted by long toil over the intricate and wonderful structure of the human body, the sons of science have bravely and nobly perished, that man might be brought into more intimate relations with that creation of which he has been made lord and master. Clothed now with the heroism and self-sacrifice which ennoble every great and good cause in which man can engage, science goes on from achievement to achievement, and will continue to go on until she reaches that boundary which is drawn between the human and the divine, and beyond which we "walk by faith and not by sight."

That this path lies before her, who can doubt? In the material world which lies all around us, in the earth on which we tread, and from which we draw our very existence, are constantly recurring phenomena, which have thus far seemed to

defy all human ingenuity to comprehend or control. But one by one they are explored, until what before was dark, seems illumined by a radiance almost divine. To all of us, for instance, has been brought home, the sad and sudden and distressing calamity, "the terror which walketh in darkness, and the destruction which wasteth at noon-day." Stricken homes and wasted fields are too familiar to all men. And man seems to have been powerless, thus far, in anticipating or preventing the ravages of contagious diseases and epidemics, or of destroying the swarms of destructive insects which invade his crops. And now Mr. Huxley steps forward and declares: "It is at present a well-established fact that certain diseases, both of plants and of animals, which have all the characters of contagious and infectious epidemics, are caused by minute organisms. The smut of wheat is a well-known instance of such a disease, and it cannot be doubted that the grape disease and the potato disease fall under the same category. Among animals, insects are wonderfully liable to the ravages of contagious and infectious diseases caused by microscopic fungi." Now, rejecting entirely the idea that Mr. Huxley could even "expect to be a witness of the evolution of living protoplasm from the not living matter,"—and accepting the theory that the origin of pestiferous particles, even, "is to be accounted for by the ordinary process of the generation of like from like,"—may we not believe with him that the nature and cause of many a scourge will be one day as thoroughly understood, "as is now the microscopic organism of Pèbrine, and that the long-suffered massacre of our innocents will come to an end?"

It is indeed a consolation to us to know that microscopic investigation has revealed the fact that many contagious diseases, which have been more destructive than war and famine, "are dependent for their existence and their propagation upon extremely small living solid particles," which, if they are parasites, "may be stamped out by destroying their germs." The destruction of these germs for the prevention of contagious diseases among men and domestic animals, and the employment of parasite germs for the destruction of insects injurious to vegetation, present to the practical scientist vast opportunities for useful exploration, and for actual service to mankind, which would be forever held in grateful remembrance. It is in such

service as this that science has achieved one of her most brilliant modern victories, for an account of which we are indebted to Mr. Huxley in his fascinating essay on the "Origin of Life." A peculiar epizoötic disease attacked the silkworms in France, about the year 1853, and threatened to destroy the great silk-producing industry of that country; involving a loss of thirty millions sterling to the silk-grower, and overwhelming with poverty and distress, a vast population employed in the most important manufacturing towns. After many unsuccessful investigations into the cause of this disease, M. Pasteur commenced a scientific exploration which determined the cause and provided the remedy also; and in the performance of which Pasteur added his name to the long list of those who have sacrificed themselves for the benefit of mankind. He discovered that this devastating disease "is the effect of the growth and multiplication of the panhistophyton in the silk-worm; that it is contagious and infectious, because the corpuscles of the panhistophyton pass away from the bodies of the diseased caterpillars, directly or indirectly, to the alimentary canal of healthy silk-worms in their neighborhood; that it is hereditary, because the corpuscles enter into the eggs while they are being formed, and consequently are carried with them when they are being laid; that it is an independent organism, which is no more generated by the silk-worm than the mistletoe is generated by the oak, or the apple-tree, on which it grows, though it may need the silk-worm for its development, in the same way as the mistletoe needs the tree." "Guided by this theory, he devised a method of extirpating the disease, which has proved to be completely successful, wherever it has been carried out."

Encouraged by this success of M. Pasteur, what may not the agriculturist expect from that alliance between himself and science which has been established during the last quarter of a century. Not that science will ever enable the farmer to shut his eyes to those great influences of nature, which the hand of man cannot reach, which no investigation can fathom, no human power guide; not that it will enable us to control the skies and the seasons; not that it will ever invade that unexplored region, where lie the strange forces which we all, philosopher and farmer alike, admire, obey, and leave with the good God who

made them; but that we may discover and remove the causes of disease in our soils and our animals; that we may make war upon the insects which ravage our fields and orchards, with some more potent agency than our hands and implements; that we may rescue our crops from those maladies which seem to put a limit to their very existence on the earth; and that both visible and microscopic organisms will one day be destroyed by antagonistic organisms controlled by man. That this is expecting too much of science, I cannot for a moment believe, supported as she may be by an accumulation of appropriate facts, and guided by accurate experiments.

And now I turn for a moment, with the deepest interest and the most profound respect to that struggle which science is making to enter the great domain of social and civil economy, and to establish fixed laws by which society and the State may be guided and elevated. Met, as she is, on the very boundary of this domain by every variety of human taste and necessity, by a great diversity of social and civil organization, by all the various opportunities and obligations which attend the geographical divisions, the mountains, and plains, and sea-coasts and islands, by a thousand industries new and old, and by all the established systems of society and State, every one of which virtue irradiates and vice deforms, her task becomes at once difficult, her temptations great, her dangers imminent. If there is any field in which she is to exercise the soberest judgment it is here. If there is any investigation in which facts are to be collected, arranged and weighed, it is where the prosperity, and happiness, and elevation of the human race are concerned. The soundest political philosopher is he who, gathering together all those causes of prosperity, general, diffused, and attended by popular virtue, which history provides, accepts the lesson which they teach, and promulgates the laws which they indicate; not he who starts with his theories, and bends to them his facts. That virtue and morality attend general prosperity, no one can deny; that vice waits upon poverty and idleness, is too true, and too sad; and recorded facts may teach us what has developed the one, and in consequence suppressed the other. If the record of executive power, here or elsewhere, points to encroaching dictation; if the history of legislative action is nothing more than the annals of corruption; if the chapter of civil

service is black with incompetency and dishonesty; it is indeed time that political science should organize a State more worthy of a free and enlightened people. If, under any system, the capital of our country has been scattered, and the labor of our country has been beggared and oppressed, let political science proclaim its reform at once. But let us, at any rate, look at things as they are.

For one I accept American facts as the foundation of American theories of public policy. A century of American nationality has its useful and encouraging lesson, of which we all may be proud, and from which we cannot turn in hopes of being taught a better. We have arrived at a system of government in which human equality is recognized; and in which industry, intelligence and morality are considered the attributes of good citizenship. We have reached a degree of prosperity, and wealth, and social comfort, and elasticity, and vigor, in which all may share, unknown in all its characteristics elsewhere on the face of the earth. Making this a standard of political science, I am ready to accept it, both as a guide for the future, and as the law of American nationality laid down by the fathers, who believed in American citizenship as an opportunity for human development, and in American industry as the vital force of our own country, an example for others to follow, and in no way to be guided and controlled by inferior, and as we think, less humane systems. We have learned much by our own experience as a nation; more than by the experience of others. Let this, then, be the foundation of American political science.

To that scientific thought which never tires in its explorations, and which may find its problems in every sphere in life, we submit our material welfare, relying upon the wisdom and integrity which now lie at the foundation of all its true success. And wherever the fraternity of philosophers inspired by this thought may turn their vision, whether to the heavens above, or the earth beneath or the waters under the earth, to our firesides or our public councils, there may they learn those laws of nature and of society, a knowledge of which may ennoble and purify the work committed by the Father to his children here below.

The Board then adjourned *sine die*.

ANNUAL REPORT OF THE COMMISSIONERS ON CONTAGIOUS DISEASES AMONG CATTLE.

To the Honorable Senate and House of Representatives of the Commonwealth of Massachusetts.

Complying with the requirements of the statute, the Commissioners on Contagious Diseases among Cattle herewith present their Annual Report.

At the time the report for 1870 was presented, a contagious disease known as epizoötic aphtha was prevailing quite extensively in the State, and causing much alarm to cattle owners and the public. All the then ascertained facts in the case and the measures which the Board had instituted to check its dissemination, and, if possible, eradicate it, were fully stated in that report. To meet the emergency and enable us to proceed in our work, the legislature, quite early in the session, made an appropriation of five thousand dollars. At that time circulars had been sent to all the cities and towns of the State, notifying their municipal officers of the existence of the disease in various sections; that the market yards of Brighton, Cambridge and Medford were unsafe localities; that it was forbidden to drive to those markets store cattle, milch cows or working oxen; and calling their special attention to the law which prescribed their duties in such an emergency.

To make our regulations effective and to assist the local authorities in this work, on the 12th of January Mr. Edward R. Craig, of Brighton, was appointed inspector of the cattle markets in the vicinity of Boston, and was instructed to stop all cattle being driven to or from those markets, except healthy beef cattle to be driven to places of slaughter. At the same time the several railroad corporations were forbidden to take upon their cars or to transport any but that class of cattle. Notwithstanding the thorough enforcement of these stringent regulations, the consumers of our cattle products were greatly alarmed for the public health, and the consumption of beef and milk decreased to such an extent as to disarrange and seriously affect the trade in those products. The measures of the Board were intended to and did protect the community from the consumption of unwholesome articles of food, and the alarm was groundless. Yet, to give the public confidence and relieve the

trade of its embarrassments, on the 19th of January, a statement of all the facts in the case was published, and a circular was sent to the towns from which milk was sent to market, directing the authorities to appoint inspectors in their several localities, with instructions to enforce the existing regulations and see that no milk was sold but that of perfectly healthy herds.

The disease was introduced here insidiously, and, by the movement of cattle in the usual course of the trade, it was widely disseminated before its nature or hardly its existence was known to the Commissioners or our stock owners. But the perfect isolation of all diseased herds, the prohibition to the driving of cattle in all infected neighborhoods, and the absolute interdiction of stores, milch cows and working oxen from the distributing markets, at once checked its progress, and the short time required in ordinary cases for its incubation, development and recovery, enabled us to control it in the locaties where it existed. But the eradication of the contagion, or the killing of the poisonous power of the virus in places infected by it, was a more important and difficult matter. It was found, during the winter, that the disease was in abeyance when the ground in infected inclosures was frozen, but the introduction of healthy cattle when the earth was softened by thawing, caused a new outbreak. This fact made it clearly apparent that if we would prevent this malady from becoming permanent here and annually inflicting the enormous losses it has occasioned in England and on the European Continent, some method must be devised to compel the perfect disinfection of all places where it had existed. To accomplish this object, on the 4th of March the Board prepared minute directions for the disposal and disinfection of everything which had come in contact with the sick animals or which could reasonably be supposed to be infected with the poison; which directions were sent to all our municipal authorities and the owners of our market yards, directing them to see that they were rigidly complied with, at the expense of the owners of such premises, and to report to this Board the accomplishment of the work on or before the 20th of April. At the same time notice of these measures was sent to all the railroad presidents of the State whose roads extended to the north and west, and they were required to disinfect thoroughly

all the cars which they used in the transportation of cattle, and all the places where they yarded and confined them.

During the winter, fat cattle from Albany and the West were allowed to be brought here and slaughtered to supply our markets, and no harm resulted therefrom; but on the arrival of warm weather, after much expense had been incurred in cleaning and disinfecting the cattle yards and drives of Brighton, it was found that cattle which were just developing the disease were being brought there from the yards at Albany. This fact proved that the market places of Albany were poisoned and that all our labors and regulations would be of no avail unless the proprietors of those grounds could be induced to coöperate in the work by cleansing and purifying their premises. Communications were therefore sent to them stating the facts in the case, and on the 20th of March the Commissioners visited that locality and had a conference with them on the subject. As the result of that conference was not satisfactory and the evil still continued, on the 30th of that month our cattle dealers were notified of the danger, and advised to follow the example of the traders of Rhode Island, by completing arrangements for supplying themselves with cattle from Chicago via the Grand Trunk and Northern Railroads, thus avoiding the infection at Albany. At the same time communications were sent to the lessees of the Albany yards and the superintendent of the New York Central Railroad, making a renewed statement of the facts and giving information of the purpose of this Board to prohibit all cattle which should go into those yards from coming into Massachusetts unless they were thoroughly disinfected.

The result of these efforts was to awaken those parties to the importance of the matter and secure their hearty coöperation; and on the 24th of April a communication from them notified us that their premises had been cleaned and disinfected with carbolic acid, and were believed to be perfectly safe and harmless. Through the operation of these various measures, the new developments of the disease, which occurred on the approach of the warm season, materially subsided during the month of April, and at the time of the reception of the news of the purification of the market grounds of Albany, there were no known cases of it in the Commonwealth. At that time

returns had been received from most of the municipal authorities within whose limits the disease had existed, that infected places had been purified and everything supposed to be capable of spreading the distemper properly disposed of. The Board being satisfied of the fact, all restrictions against the free driving and transportation of all kinds of neat stock were removed the first of May, and this important branch of our trade and thrift at once and with confidence resumed its accustomed channels.

This disease has for many years ravaged and scourged several European countries, causing annually an enormous loss of property, and is raging there at the present time with great virulence; but not a case of it, to our knowledge, has occurred in this country since the 20th of last April, and it is to be hoped that it is effectually eradicated. If such shall prove to be the fact, the cost of carrying out the regulations of the Commissioners and the quite general interruption of the usual trade and profit of this business for a limited time, will be of no account when compared with the benefit of the results. It is a very noticeable and important fact that notwithstanding the continued prevalence of this contagion in England for many years, with the exception of a short period when the movement of cattle was prohibited in consequence of the existence of a more deadly plague, that it should apparently have been entirely suppressed here within six months of its first outbreak.

It is not impossible that our drier, warmer summer climate may have had some influence on its poisonous propagating and virulent properties, though we know of no record of cases abroad of greater malignity than some observed by us in the towns of Stow and Bolton. Whatever change, if any, climate may have produced in the type of the disease in other respects, its extremely contagious character was fully developed; and that we have been able to control and suppress it is undoubtedly owing to the fact that we have laws framed to meet such an emergency. The wisdom of these statutory enactments has been abundantly demonstrated at two important junctures: first, in 1867, on the breaking out of the Spanish fever, and now, in the foot-and-mouth disease.

There is no reasonable doubt but that if such laws had existed here at the time the contagious pleuro pneumonia was imported

among our herds, it might have been quickly controlled, and hundreds of thousands of dollars saved to the State. The peculiar efficiency of our statutes consists in the complete control they give the officers of the law over all the cattle of the State, to prevent their being driven from place to place, to isolate them when suspected of contagious disease, to direct all municipal officers, and to punish all persons who shall neglect or refuse to comply with the regulations of the proper authorities. The laws referred to apply only to "contagious diseases among cattle." Their existence costs nothing when our herds are not exposed to danger, but they enable us to act with great efficiency and promptness whenever an emergency arises.

Almost simultaneously with the appearance of this disease in our State it broke out in Rhode Island, Connecticut and New York. The cattle commissioners of the former States were in constant communication with this Board so long as it was rife, and coöperated in the general measures for its suppression. By invitation of the board of New York, all the commissioners of the New England States met them in convention at Albany on the 8th of last February, "to concert measures for the eradication of the disease from the country." Much information was then obtained in relation to its introduction and dissemination in our respective States, but it was found that though New York, in consequence of its great distributing markets, was the most important point to attack the disease in the interest of the whole country; yet that State was entirely without laws for the suppression of contagious diseases among cattle, and its commissioners powerless to enforce any regulations for that purpose. In consequence of this, little was accomplished by the convention but to petition the legislature of that State to remedy the defect and ask the National Government to interdict cattle affected with this disease being brought into the country.

The legislature of New York failed to enact any statutes to meet the emergency, and the final extinction of the malady and the prevention of a new outbreak by disinfection, even in that State, is largely due to the measures of the commissioners of Massachusetts and Rhode Island, enforced by the very effective and stringent laws of these States.

Whatever of doubt and mystery was connected with the origin, importation and spread of epizoötic aphtha in the State, existed at the time our last report was made, investigation has completely dispelled. Without giving publicity to the innocent and unfortunate party who was the prime cause of its introduction, it is sufficient to say that it was imparted to a single herd in Canada by an importation from England in August, 1870; and almost before its nature and results were known, it spread through several townships. Thence, by the transit of stock, it was carried to Albany and several of the counties of Eastern New York and Western Connecticut. From Albany, also, it was transmitted to Brighton, thoroughly poisoning the yards in that place, and by distributing cattle from that point it was disseminated among our home stock over a wide extent of country in this and the adjoining State of Rhode Island.

To ascertain, if possible, the exact extent of its dissemination in this State, the probable losses it has occasioned, and to collect information which might be valuable in any similar emergency in the future, the Commissioners, on the 4th of March, sent a communication to the proper officers of every municipality in the State requiring them to report to this Board, answers to the following questions, viz. :—"How many herds of cattle in your town or city have had the disease called epizoötic aphtha, or foot-and-mouth disease?" "How many single animals in those herds have escaped it?" "How many animals in all have had it?" "How many have died from it, either directly or indirectly?" "From what source did the cattle of your town obtain it?" "What is the estimated loss or damage to the stock of your town by the disease?" Through the negligence or indifference of the authorities after the subsidence of the disease, only partial returns have been received to the circulars sent out. From those received, however, and from the personal knowledge of the Commissioners, it is certain that it prevailed to a greater or less extent in at least seventy-five towns and cities of the State; that it visited more than two hundred herds, and the number of animals which had it was upwards of three thousand, and the number in those herds which wholly escaped it was three hundred or about one in ten. In the eastern part of the State every case was traced directly to Brighton or to cattle which came from thence, and in the western, to cattle from

Albany. The number which died with the disease was twenty-seven or about one in a hundred.

Owing to neglect in making the returns, the exact extent of the losses it has occasioned can only be approximately ascertained. But from the data received we feel justified in saying that the losses by injury to the infected stock, the total interruption of some branches of the cattle and milk trade, and the inability to employ oxen as working teams during the prevalence of the disease, must have occasioned an aggregate loss to the community of at least a hundred and fifty thousand dollars. The expenses incurred by the Commissioners during the year, as shown by the auditor's books, is three thousand one hundred and fifty-seven dollars and sixty-nine cents ($3,157.69). A part of this sum, though shown on the books of this year, was expended in 1870, on the occasion of the appearance of a singular malady in southern Berkshire, supposed to be contagious. Of the appropriation made by the legislature this year, one thousand eight hundred and forty-two dollars and thirty-one cents ($1,842.31) remain unexpended.

Epizootic Aphtha, Epizootic Eczema, Foot-and-Mouth Disease.

This disease first made its appearance in England in 1839, and it is generally believed to have been introduced from the Continent.

It has prevailed, more or less, since; yet while restrictions were in force (during the prevalence of rinderpest), preventing the moving and traffic in cattle, foot-and-mouth disease and pleuro-pneumonia were almost totally unheard of, isolated cases only occurring. Since the restrictions were removed, both diseases have prevailed and great losses have been sustained.

The first known outbreak in this State occurred at Brighton, among a lot of cattle which were being fattened; inability to eat, with a great flow of saliva, and lameness, were the symptoms. As they appeared to lose flesh rapidly, all were slaughtered and sent to market.

As the owners were ignorant of the nature of the disease, no precautions were taken. Other cattle were placed in the yards where the diseased had been kept, and sold to go to different places, carrying the malady which was contracted by being in those yards (in some cases but a few hours) wherever they went.

Symptoms.

The symptoms of foot-and-mouth disease are usually well marked,—so much so that mistakes rarely occur. Either the animal is observed to walk lame, in many instances before vesicles appear on the surface, or is unable to eat, though apparently anxious to do so. In some cases, both the mouth and the feet are affected from the earliest appearance of the disease. Upon examination of the mouth, vesicles will be found on the tongue, roof of the mouth and inside the lips, the saliva flowing freely.

Upon the feet, immediately above the hoofs, either between the digits or on the coronary surface, and the skin of the heels, vesicles appear, burst and discharge fœtid matter. In severe cases, the skin of the udder is affected; vesicles appearing, the gland itself becomes inflamed, abscesses form, and the animal is entirely ruined for milking purposes.

Occasionally, though rarely, cattle are found with both the mouth and feet in a diseased condition, which, to the ordinary observer, would appear to be affected with the disease in question. To the pathologist, it is distinctly different.

Treatment.

The more simple the treatment, in most cases, the better the result. For the mouth, a weak solution of alum, one part to twenty-four of water; for the feet, sulphate of copper (blue vitriol), one part to sixteen of water, and carbolic acid, largely diluted, applied alternately, and keeping the feet clean and dry, include all the treatment necessary in ordinary cases.

In answer to the question, Is there any liability to a recurrence of this disease? we quote from the "London Veterinarian," p. 203, 1861, the following:—

"*Prevalence of Eczema Epizoötica.*

"During the last four weeks, the so-called 'mouth-and-foot disease' has prevailed to a very serious extent among the cows of many of the London dairies.

"Several animals have died from irritative fever, deep cellular abscesses, etc, but on the whole the deaths have not been very numerous. Great numbers, however, have been rendered useless for milking purposes, in consequence of severe attacks of mammitis,

both as concomitants and sequelæ of the malady, thus taxing to the utmost the ability of the proprietors to furnish the required supply of milk to their customers.

"It is a fact, of great pathological value, that not only have *secondary* attacks occurred in several of the animals, but even tertiary in some few of them."

In the Second Annual Report of the State Board of Health, pp 426, *et seq.*, will be found an interesting article, describing the symptoms and progress of the disease in three persons, acquired by partaking freely of milk drawn from cows affected with the disease. In conclusion, the writer says: "In accordance with the general law that animal poisons are destroyed when subjected to a very high temperature, we are justified in believing that the affection can never be communicated to man through the medium of the meat, provided it be thoroughly cooked, and, upon the same principle, the milk might be rendered innocuous by being boiled."

In the "Lancet," 1869, in an article headed "Foot-and-Mouth Disease in relation to the meat and milk supply," is the following: "Boiling the milk has been recommended for the purpose of preventing or lessening its injurious action; but, as a matter of fact, it may be stated that boiling does not alter the appearance of the morbid elements, nor does it arrest the movements of bacteria in the fluid."

Contagion.

That the disease is highly contagious does not admit of a doubt. Cattle have become infected by being driven over the highway where diseased oxen have travelled. A single animal, which was purchased at Brighton, has carried the disease and infected a herd of fifty head. As with all contagious diseases, individual cases occur which are insusceptible to infection. A large steer, recently slaughtered, weighing over two thousand pounds, was daily turned into the yard, and drank the water from the same trough where infected cattle were supplied with water; he escaped. Is the milk of cows affected with "foot-and-mouth disease" healthy? The answer is, emphatically, no. From the limited time the malady existed in this State, little is known of the effects of using the milk of diseased cows. Chemical analysis, however, sufficiently demonstrates the fact.

Mr. Henry W. Vaughn, the milk inspector of the city of Providence, who is a practical chemist, has analyzed samples of the milk of cows sick with the "foot-and-mouth disease," at different stages of the disease. The results of these analyses are very valuable in their relation to the character and progress of the disease, and are therefore deemed important to be given here.

The following table shows the results of four analyses. No. I. is the analysis of the milk from a cow in the worst stage of the disease. No. II. is milk from the same cow seven days later. No. III. is milk from a cow three weeks after the first symptoms of the disease were seen. No. IV. is the average results of the analysis of thirty samples of milk from healthy cows :—

	I.	II.	III.	IV.
Reaction, . .	Strongly acid.	Slightly acid.	Alkaline.	Alkaline.
Water, percentage,	91.038	88.710	85.30	84.71
Solids, percentage,	8.962	11.290	14.70	15.29

The solids consist of—

Caseine, . .	5.430	5.540	5.03	5.29
Fats, . . .	2.30	2.88	4.70	4.96
Sugar, . . .	.542	2.13	4.13	4.23
Salt, . . .	.69	.74	.75	.81

Mr. Vaughn says: "In sample No. I. the caseine was coagulated, occupying about fifty per cent. per volume. Under the microscope, there were but few fat globules, of irregular shape, and blood globules were disseminated through the mass."

The analysis of sample No. I. shows a very serious disorganization of the normal constituents of the milk. The sugar is converted to acid, the percentage of water is largely increased, the proportion of fats is much diminished, while the appearance of blood globules indicates serious trouble.*

* Report of Rhode Island Cattle Commissioners.

During the prevalence of the contagion, applications were frequently made to the Commissioners for remuneration by the State for the various losses which individuals had suffered by it, showing a great misapprehension in the community respecting the powers and duties of the Board, and the purpose for which it is appointed. The law creating and defining the duties of the "Commissioners on Contagious Diseases among Cattle," was clearly intended to guard the community from the spread of contagious disease, and ample power was given the Board, so that in extreme cases, if it was necessary, in order to stop contagion, healthy but infected cattle might be slaughtered at the expense of the State; but not to pay for cattle dying of disease, the expenses of their sickness, or the incidental losses it might occasion. Entertaining this opinion, the Commissioners have refused any remuneration to sufferers, though their losses have been disastrous. With the exception of the disease referred to, the herds of the Commonwealth have, during the year, been healthy, and our great interests in cattle and their products have been prosperous.

LEVI STOCKBRIDGE,
E. F. THAYER,
H. W. JORDAN,

Commissioners on Contagious Diseases among Cattle.

BOSTON, Dec. 29, 1871.

ANNUAL MEETING OF THE BOARD.

The Board met at the office of the Secretary in Boston, on Monday, the 5th of February, at twelve o'clock, His Excellency, Gov. WASHBURN, in the chair.

Present—Messrs. Allis, Baker, Bradford, Bucklin, Davis, Fearing, Goodman, Hubbard, Hyde, Johnson, Knowlton, Ladd, Loring, Moore, Peck, Saltonstall, Slade, Stockbridge, Stone, Ward, Washburn and Wilder.

The records of the last annual meeting were read and accepted.

Messrs. Wilder, Saltonstall and Goodman were appointed a committee upon the order of business.

On motion of Mr. Davis it was

Voted, That upon all hearings upon applications for a change of time for holding Annual Fairs of an Agricultural Society,

the committee shall notify the delegates of all societies in the county, and of other societies whose fair is held within twenty miles.

The committee on the order of business then submitted the following

REPORT:

1st. Reports of Delegates to county exhibitions.
2d. Reports of Committees on subjects assigned for essays.
3d. Report of the Committee on the Agricultural College.
4th. Miscellaneous Business.
5th. Appointment of Delegates.

The sessions to begin at 10 o'clock, A. M. of each day.

The Committee also suggest that the committees on the selection of subjects for essays and on the annual country meeting be appointed on Wednesday morning.

(Signed) MARSHALL P. WILDER.
LEVERETT SALTONSTALL.
R. GOODMAN.

The report was accepted.

The reports of delegates being in order, Mr. Stone submitted a report upon the Middlesex Society; Mr. Allis upon the Worcester; Mr. Hubbard upon the Worcester North-west; Mr. Vincent (read by the Secretary) upon the Highland; Mr. Allis upon the Hampden; Mr. Johnson upon the Worcester North; Mr. Ward upon the Bristol Central; and Mr. Hyde upon the Hampshire.

Mr. Fearing also made a highly interesting verbal statement upon the exhibition of the Hingham Society.

After the transaction of some further business the Board adjourned.

SECOND DAY.

The Board met at ten o'clock, A. M., on Tuesday, His Excellency, Gov. WASHBURN, in the chair.

Present—Messrs. Allis, Baker, Birnie, Boise, Bradford, Bucklin, Converse, Davis, Ellsworth, Fay, Fearing, Goodman, Hubbard, Hyde, Johnson, Knowlton, Ladd, Loring, Moore, Peck, Phinney, Plunkett, Slade, Stone, Stockbridge, Ward, Washburn and Wilder.

Reports of delegates being in order, Mr. Ellsworth presented a report upon the Essex Society; Mr. Peck upon the Middlesex North; Mr. Bucklin upon the Worcester South-east; Mr. Goodman upon the Bristol; Mr. Knowlton upon the Hampshire, Franklin and Hampden; Mr. Brown upon the Hampden East; Mr. Ladd upon the Berkshire; Mr. Converse upon the Housatonic; Mr. Baker upon the Union; Mr. Stockbridge upon the Franklin; Mr. Slade upon the Hoosac Valley; Mr. Fay upon the Norfolk; Mr. Birnie upon the Plymouth; Mr. Boise upon the Marshfield and Mr. Phinney upon the Nantucket.

Mr. Hubbard was appointed a committee on the credentials of new members.

Mr. Ellsworth then submitted the following essay upon the

MANAGEMENT OF THE DAIRY.

Of the different branches of farming, the dairy unquestionably ranks first. The same might have been said of it fifty years ago. We can hardly understand as we look over the State and observe the many deserted farms, and barren acres, how this interest, to-day, holds a place second to none in the long list of agricultural pursuits. In the time of our fathers, our farms were rich in natural fertility, and supported large herds without resorting to artificial helps, and yet, although our lands have depreciated in agricultural value, dairy farming has not only held its place as first, but has actually increased in extent and importance nearly twofold since those days. Such is the fact, however, astonishing as it may seem, and of the many reasons to which to ascribe the remarkable growth, there are at least three prominent ones.

1st. The improvement in dairy stock and the management of the same. This is a more important reason than we can realize. It has affected the whole dairying interest by giving us better machines, so to speak, with which to work, and by throwing around this pursuit a sort of fascination, which has led the dairyman to take a deeper interest in his calling. Instead now of the large herds of scrubby native stock without pedigree, and whose physical qualities could never be predetermined, we have our grades and pure-bred cattle with a well-defined pedigree, showing their descent from animals whose characteristics were marked and well developed. What would the dairyman

do without his carefully bred animals, without his Shorthorns, or grade Shorthorns, his Ayrshires, Devons or Jerseys, or crosses effected between these breeds? Without them, however hard he might labor, we fear his efforts as a dairyman, would be attended with little success.

In relation to the management of dairy stock, that indeed has undergone a decided change. The farmer of to-day, who is feeding his herds as his fathers did, is either an unmitigated conservative, ignoring modern discoveries, or else is an inactive, shiftless man, with hardly sufficient life and enterprise to care for his faithful herds, and much less to make improvement in his treatment of them, and so not only doing a valuable service to them, but materially benefiting himself. The management of dairy stock has been so much improved within the last twenty-five years, that it holds an important place in its effect on the development of dairy industry in this country; in fact, we doubt if there has been another influence more potent in its growth than that of the improved management of the dairy cow.

2d. The manufacture and marketing of dairy products as influencing the growth of the dairy. The improved methods of manufacturing butter and cheese, and the facts and discoveries wrought out in relation to the same, have all played their special parts. The introduction of the cheese factory, one of the greatest blessings to the farmer and his family, has no doubt greatly influenced the development of this branch of dairy farming, while the improved methods of gathering cream and churning the same, in a measure lightening the labor of the dairyman and increasing his profits, have done much to advance the growth of this department of the dairy. As to the facilities of marketing dairy products, only a word need be said. They, of course, have held the same relation to the development of this interest as to every other interest in the country. The great facilities of travel, coming as they do to almost every farmer's door, have affected this calling as much as any other in the land.

3d. The last and most important cause to which we credit the rapid development of the dairying interest in this State, is the increase of population, which has created a greater demand for dairy products. If the demand for these increase two-

fold, the supply will increase in the same ratio. Although the State does not furnish the whole of this supply, and probably never will, as other States are constantly sending in, still a growth in population will produce a corresponding growth in dairy farming. More especially, however, will an increase in the population affect that department of the dairy known as milk-farming. Nearly all of our large farms in the vicinity of large towns and cities have already been converted into milk farms, and eventually, we believe, the principal dairy farming in this State will be that of producing milk for home consumption, and consequently, will be carried on in the neighborhood of chief centres of business.

We come now to speak of the cow herself. In this important branch of farming she plays the most prominent part, and too much cannot be said in her praise. Is there a more gratifying sight in our daily life than the dreamy, good-natured cow,—perhaps the property of some poor family who are dependent, in part, upon her for their support,—after she has completed her day's work and is quietly waiting for some one to draw from her a bountiful supply of one of the richest and purest delicacies ever furnished to man? Is there any animal that commands our respect to a higher degree or to which we should feel more grateful? We read that the ancient Egyptians used to worship the bull, but if our devotions are to be paid to any brute, is not the cow more deserving of this tribute? The bull was reverenced as a symbol of productiveness, yet how much more should the cow be reverenced, for she not only produces, but rears her own young, and at the same time helps to rear the young of the human family. She gives us veal, milk, butter and cheese, and finally yields up her own body for beef. The number of different varieties of food for our nourishment and gratification, that milk enters into, as an essential part, it would be difficult to determine. It has been found by careful scientific research, that one pound of cheese is equal, as an article of diet, to two pounds of beef; and an experiment made in France about ten years ago, proved that it cost no more to produce three pounds of cheese, than one pound of beef. But whether this is so or not, there is no doubt that the cow is the most useful to man of all the domestic animals. Therefore, the selecting, raising, managing and feeding of the dairy cow,

as well as the best methods of disposing of her products, are of no small importance to the farmers of Massachusetts.

MANAGEMENT OF THE DAIRY.

We do not propose to speak of the different breeds of cows, nor to select any one as best adapted for a special purpose. There are, at least, half a dozen different breeds in the State, some of which are specially adapted to the wants of the farmer in one locality, while others would be equally good and perhaps better in other sections.

The good qualities of the different breeds have been so often discussed in the agricultural papers and elsewhere, that we presume farmers generally have selected such as best suit them for that branch of dairy farming which they wish to follow. But the general management of the different dairies is or should be nearly the same in all. We believe there are very many intelligent farmers in this State who do not manage their dairies, as to raising, feeding, &c., as they should. Much depends upon the management of the young heifer whether she makes a good or a fair dairy cow. A heifer can, by careful treatment, be taught to be a good milker.

We are told that the cow, in its natural or wild state, barely gives milk enough to raise her young; and there are certain herds in this country where size and form are especially sought for, that will do but little more; while at the present time, there are cows in our midst that give twenty to twenty-four quarts per day for a considerable time during the best of the season. But this improvement is brought about only by skilful management.

To raise a good cow we should first select a calf from a well-bred mother that is fully matured, say from three to nine years old, and known to be a good milker. The father should be thoroughbred, not less than two years old, and descended from a good milking family. We should prefer the calf to be an early one, not later than March, and if earlier it is better. By being early the calf gets a good start in the spring, and will, if well cared for, come to the barn in the fall, large, strong and healthy, and will usually come in when two years old and make a good-sized cow.

There is nothing so good for the calf as new milk, either

taken directly from the cow, or drunk. But few farmers can, however, afford to bring up a calf wholly on new milk.

We have practised raising calves by allowing them to suck the mother about four days, then teaching them to drink, which is easily done, with new milk. Let the calf lose one meal from the cow, and it will almost invariably drink, when the milk is offered. It should have new milk until fifteen days old, then this can be mixed with an equal amount of skimmed milk or oatmeal porridge. Care should be taken not to feed too much; four quarts is enough to give at once. We should try, also, to teach it to eat early-cut hay, roots, oats and shorts. In this manner the calf will grow *straight* and *healthy*. It is wrong, however, to allow a calf to drink a large quantity at a time of anything. Calves can be raised upon hay-tea, porridge, &c., without any milk, but we think that if a farmer is so situated that he cannot afford a calf new milk one week, then one-half skim milk until it has a stomach sufficiently strong to digest more solid food, he had better buy his cows rather than raise them. A heifer should be kept thriving until she comes to milk, and if possible she should drop her first calf while in the barn, or just before going to grass, as there will be less danger of having trouble with the udder. After well in milk, she should be liberally fed, carefully and regularly milked until near her next calving time. By such treatment, if she is of good blood, she will generally make a good cow and hold out well. Heifers should be frequently handled and petted from calves; then they will be more easily handled for milking.

The milch cow should be gently and carefully treated, and should have her wants as fully supplied as may be at all times of the year. Although she should be allowed to go to the ground as soon as practicable in the spring, yet she should not be permitted to run upon the summer pastures until they can afford her a good supply of food. It is poor economy to allow herds to roam all over the pastures clipping the young and tender grasses before they yield much nutriment.

When the change is made from hay to grass it should be done carefully and gradually; the cows should have a foddering of the best hay twice a day as long as they will eat it; if extra feed has been given it may now be discontinued.

In order to keep up a good flow of milk a constant supply of

food suited to the wants of the cow must be given, and care must be taken to provide against the falling off of this supply as the pastures dry up. It requires a certain amount of food to support nature. All above this generally goes to make milk, or beef if the animal is not in milk. The cow, therefore, should not be allowed to shrink her milk early in the season for the lack of a sufficient amount of food to make it. What that supply shall be every farmer has a preference. I plant southern and sweet corn and cabbages as well as sow millet, grain and flat turnips, endeavoring to have them succeed each other as they are required by the cows. I have never, except in two instances, during the past fifteen years, put in a soiling crop, without having a special call for it before winter. These so-called green crops, I always feed in the barn, with the exception of the flat turnips which I pull and strew on the grass ground, immediately after milking. Turnips fed in this way will impart no unpleasant flavor to the milk or butter.

The most satisfactory way of salting cows, with me, is to give about a dessert spoonful each morning, while giving green or summer feed. This amount they will always eat with good relish. In winter, instead of salt alone, I feed twice a week with salt, plaster and wood ashes mixed in equal parts, a tablespoonful at least.

MILKING.

It is of the greatest importance to the dairyman that the milking should be done in a proper manner and at regular intervals. If the cow is kindly treated she will give down her milk with pleasure; but if roughly used she will hold up some part of it, and the quantity will gradually diminish till it will hardly pay for milking. Everything should therefore be calm and quiet about the milking stable. The milker should sit down to the cow with the pail in his left hand; commence brushing the udder and teats with the right, carefully for a few seconds. In this way the udder and teats will become clean, and the cow will be ready to give down her milk and no time will be lost. Then commence the operation by shutting the upper part of the hand close to the udder, gradually closing it towards the end of the teats; repeating without any twitching or jerking until clean.

In summer nights the cows may be stabled or allowed to run

in the pasture according to the choice of the dairyman. We choose, however, to let them run on the same pasture night and day, changing pastures often. When the nights become cool, they should be stabled and fed regularly. The stable is best situated on the south side of the barn, well lighted, and with suitable means for ventilation. We prefer to fasten milch cows in stanchions, for various reasons: it is quicker, neater and safer, and when they are accustomed to lie in them, they appear perfectly comfortable. Calves and heifers should be fastened with chains, because, when their horns are soft, the stanchion will often cause them to grow crooked. The floor planks on which the cow lies should be of such a length that when she is down her whole weight will rest upon the platform. This platform, for a large-sized cow, should be four feet nine inches long, but slightly inclined, and raised six inches above the trench. When fastened with stanchions upon a raised platform of suitable length, it is very little trouble to keep animals clean. If one prefers to fasten with chains, the floor must be longer in order to keep them clean, as they change their position so often. For bedding we should recommend the free use of sand when it can be obtained. Experience has shown that it rids cattle of vermin, and moreover it is of great value in the manure pile, especially for a clayey soil.

In relation to the construction of the manger it may be proper to say a few words. The general rule for our guidance, however, in its construction, should be to promote the comfort of the cow in eating from it. To accomplish this the floor should be raised about two inches above the platform on which the cow stands, thus preventing all reaching for food, and from slipping and falling upon the knees.

WINTER FEEDING.

Having considered what we think to be the proper method of raising the cow from the calf, and of tying her up, and having spoken of the floor upon which she stands, and the manger from which she eats, we properly come now to consider her food and the manner of feeding it. It is not so much the kind of food, or how we prepare it, as the *method of giving it*, that we are to consider. In regard to the preparation, however, some recommend very highly steamed feed, and claim it to be a great

saving of fodder; others give cut feed with equal satisfaction; while still others claim that the common dried fodder properly fed is the most economical when the cost of steaming or cutting is taken into account. Whether the steaming of food is a saving or not, we feel sure that it cannot come into general use on account of the expense of getting and arranging the necessary fixtures. The same in regard to expense is true in relation to the cutting and mixing of feed for stock. Although but a few fixtures are required, yet it takes much labor; the labor we employ is generally of so poor a quality and yet so expensive to hire, that the less we needlessly employ, the more successful will be our farm operations. I have formerly given cut feed to considerable extent, and have concluded that it is considered a saving because it is fed in less quantities and with more regularity. Now, when a farmer is convinced that he can make a saving without extra cost by adopting a different method from the one he has generally followed, he is not very slow to try the experiment.

The course which I pursue in feeding I adopted twelve years ago. It has been styled the "Barre system," and the credit of originating it has been given to me. I liked the system so well, and my stock did so much better than before, that I began to tell my neighbors about it, and the per cent. of fodder which I was confident I had saved. Some hardly believed me; but as hay was very high that season, they began to try it, and thus it was adopted. I remember, about ten years ago, of taking a long ride with one who was then, as he is now, a member of this Board; and as we drove slowly along through the mud, I told him how I fed my cows. The system seemed to strike him favorably, for he not only immediately adopted it himself, but from that time, whenever and wherever he has spoken about feeding stock, he has recommended this system which I then related to him.

The system of winter feeding, as we have practised it, is as follows: The poorest quality of fodder that I wish to feed is given first, at the beginning of each meal, and in the morning, while the cows are eating this first foddering, I commence to milk. By the time they have this two-thirds eaten, another foddering is given them of a better quality; and then the third, which consists of the best hay which I intend to feed, is given

as before, or just previous to the finishing of the second fodder-ing. By feeding in this way the cows are kept constantly eating, and will consume all that is placed before them, leaving nothing eatable in their manger. I then sweep out and am ready to feed roots, meal, &c , which are given immediately. Then com-mence to water by letting out only a few at a time and seeing that all have a chance to drink,—thus allowing little or no time between eating and drinking. The stable is then cleaned, and they are returned as soon as they have drunk. They have nothing more to eat until their afternoon meal, which is com-menced at about half-past two o'clock, by feeding, watering, &c., the same as in the morning, with the exception of the roots and meal, which are all given at one time, and that in the morning. I milk at night after watering. Nothing is fed after watering, either morning or evening.

By this method the cow has had two good meals, has drunk twice, and has at least sixteen hours out of the twenty-four in which to rest and quietly chew her cud. A stock of cows thus tended will eat one-half coarse or poor quality of fodder, with the rest of good hay and a very little grain, and keep in good health and flesh, giving at the same time a good flow of milk. When I have plenty of hay and rowen, I feed very little grain, but now, since we have had short crops of hay, I use more meal. For a milch cow I feed one quart of Indian and one quart of cotton-seed meal and two quarts of shorts, with six of sliced roots. This will make a good flow of milk without doing injury in any manner to the cow. But if my object is to make beef and milk at the same time, I increase the Indian meal according to the size and capacity of the cow.

When we tell a farmer, who feeds three meals a day, that his cows would do better with but two, he can hardly believe it, especially when he eats three times himself. Judging of the wants of a cow from our own, we can readily see why she ap-pears to want three meals a day after she has acquired the habit of eating her daily food at three different times. Now if we are convinced that this is a wrong habit, and feel sure that we know a better one, should not this better one be substituted? A cow will drink more heartily as soon as she has eaten a full meal of dry fodder than she will after she has begun to chew her cud. After a cow has finished eating, it is natural for her to chew

over this food, to extract the nutriment from it. It is undoubtedly right that she should have sufficient time to do this. If three hours is enough to accomplish this, she should then be fed again; but if not, why not wait until she has finished? A well-fed cow will chew her cud continually for six hours if she is not molested; but should she be offered a good foddering of hay in three hours from the time she was last fed, she will eat it.

The point for us to settle here is, whether the cow is better off for being fed in three hours, or to wait six, until she has finished chewing her cud, before she is fed again. I believe that she is better off not to have any food offered her for six hours, or between the morning and afternoon meals. If a man, now feeding a cow six pounds of the best hay and two quarts of meal three times a day in any form, will try feeding the same amount in two meals, or nine pounds of hay and three quarts of meal dry, at a time, giving what water the cow will drink directly after eating, continuing the trial for two weeks, he will be able to decide for himself whether two meals is as good or better for the cow than three.

A long experience, with a careful study of the wants and habits of the dairy cow, has convinced me that she will consume the same amount of fodder in less time, will drink more, and be better filled up, keep in better condition, with less care, and give more milk, than when fed three times.

If I had but one, or only a few cows, I would give all I wished to feed at one meal or one foddering, but, for a large herd, I should prefer to give this meal in three fodderings. The length of time required to feed varies according to the kind of food we are giving. When it is all good hay, it will be eaten in less time than when a part is of a coarse or poor quality, but in either case the cow will eat with a good appetite. As a rule, I would say, two hours is sufficient for one meal, or two and a half in the morning and one and a half in the evening. More time is required in the morning, as the roots and meal are fed at this time. My reason for feeding these in the morning is because there is a much longer time between the evening and morning meals, and the cow is therefore in a better condition to eat a richer and heartier meal.

If a cow, after becoming dry, loses flesh, as she sometimes does before calving, especially when the calf is a male, and the

cow a little thin, I feed one or two quarts of meal a day. When there is a great draft upon the system, as in the case above mentioned, oatmeal, I find, is a great help in restoring it.

The idea that a cow needs only two meals a day during the winter season, or as long as she is kept upon hay or other dried fodder, notwithstanding the fact that she will eat much oftener when obtaining her living from the pasture, may appear, to the casual observer, to be contradictory to itself; but, on a closer investigation, we shall notice a rational, and, I believe, satisfactory, reason for it. Of all the elements of which grass is composed, by far the larger part is water, which must render it much more bulky than an equal amount of hay, and for this reason more is required to supply the wants of the system. During the season, therefore, when the cow must live by her own exertions, she must labor most of the time to obtain the requisite amount of nourishment, which she is not required to do while in the barn. We must not forget, also, that pastures, in general, are kept down so close, during the greater part of the summer, that only by continual labor can her wants be satisfied.

ROOTS.

It seems to me that we can hardly call a man an intelligent farmer, or a good dairyman, who does not raise an abundant supply of the different varieties of roots, for his cows during the winter months, when they must live for the most part upon dry food. We all know and fully realize, how important vegetables are, as a part of our own diet, and is not this equally true when applied to the condition of our animals?

CARDING.

This operation is a great treat to a cow, and as much so, perhaps, to every dairyman who enjoys seeing a dumb animal happy, while no one can help noticing how impatient each cow becomes in waiting for her turn. This should not be neglected for a single day, while the herd is confined in the barn. This duty is more often overlooked by the farmer than any other.

DRYING OFF A COW.

The manner of drying off a cow so that her udder may remain uninjured, and in suitable condition to yield a good sup-

ply in the future, is of great importance. A great milker is more often troubled from this cause than an ordinary one. Drying may be most successfully done when the cow is within about nine weeks of calving, as before this time she gives too much milk; while later than this she has commenced to increase her flow to supply the calf. When I commence to dry off a cow I give a poorer milk-producing food, as well as a scanty allowance, until the flow of milk is checked, which generally requires about five days. The udder must be watched closely and should the milk become thick, or clotted, it must be frequently removed, but as soon as it becomes thin and watery in all the teats, all is well, thus leaving about five weeks in which to recruit her system.

CARE DURING TIME OF CALVING.

The most watchful care is required during time of calving, while experience and judgment are of great importance. More trouble is to be feared from an extra good cow than from an ordinary one. When a cow is expected to calve she should be placed in a comfortable stable, well protected against drafts of air, with plenty of bedding, and the herdsman should know her exact condition every hour until she calves. Soon after calving we give a pailful of water slightly warm, into which a pint of rye meal has been stirred, water often for the first twenty-four hours, warm as at first, but never give more than a pailful at a time. Only a small amount of fodder should be given during the first twenty-four hours and no grain in any form for at least four days or a week. A few roots, however, will be beneficial. The cow and calf may be kept together, for a day or two. When the calf is suckled, it should be changed from one teat to the other, as young calves will hang to one teat altogether, sucking and bunting so hard as to injure the udder, and in this way one teat will often be injured by the calf, thus lessening the flow of milk in that quarter of the udder. If at the end of one week all appears to be well, we gradually increase her feed. Trouble is easily avoided by watchfulness and care in season. When a cow has a swelled udder with high fever in it I don't allow the calf to suck, but keep her in the stable, giving her only warm drink, feed sparingly, bathe the udder often, with quite warm soap suds, and rub carefully with the hand

until dry, then apply lard, rubbing very gently. I have never failed of success, even in the most extreme cases. The above applies, more especially, to what we call great milkers as with ordinary cows, we seldom have any trouble.

PRODUCTS OF THE COW.

There is probably no way to dispose of milk so profitably, provided a fair price can be obtained for it, or exchange this product of the cow so quickly into ready money, as by selling it by the can. By this method of disposing of milk it is unnecessary to keep swine. Next to selling of the milk the making of cheese by the factory system, may be called the most desirable, all things considered. While the selling of milk may be called the easiest, the making of butter certainly requires the most attention and care. We cannot expect a prime article, unless the closest attention, together with good judgment and plenty of work, is bestowed upon it. While the principle that the demand governs the supply, is true of nearly all branches of trade, we can hardly apply it to that in choice butter. For such, the demand is always greater than the supply, and is ever on the increase. We cannot, therefore, afford to make poor butter. The market calls for nothing but the choicest, and such alone we must make, if we would follow this branch of dairying with success. In glancing over the columns of our agricultural weeklies, how often do we notice an inquiry amounting to this: Why is there so much poor butter and so little prime or "gilt-edged" in the market? Why is it that so few dairywomen can make that quality so much demanded? This they call a mystery. It is no mystery to me. The quality has been sacrificed, for the most part, by want of care and watchfulness. Not one of the many neat and careful processes can be neglected nor even slighted. Every one must be done at the proper time.

I have noticed many articles upon the general subject of butter making. One, perhaps, upon the temperature of the milk room; another as to the temperature of the cream, for churning; and others upon the amount of milk required to make a pound of butter. Some give the amount as eight quarts, others as nine, and some go as high as sixteen, but all fail to state whether this is a general average of their whole dairy,

or the milk of a particular cow; whether all the milk is taken or only the last strippings. Such experiments can be but little relied upon. We can arrive at no satisfactory result unless the tests are made with care, and when reported, it should be done minutely and correctly.

For many years I have followed cheese making, considering it the best way to dispose of my milk, but during the past year I have turned my attention to the making of butter, and, during every month, I have given my personal attention, to the making of many careful trials and noting minutely the results. Although it is easier to make butter in some parts of the year than in others, yet it is generally thought that a prime article *cannot* be made in winter. I have satisfactorily proved that this is not so, provided the following conditions are complied with: 1st, We must have good butter making cows. 2d, they must be fed upon such food as shall enable them to produce a rich quality of milk. 3d, this milk must be set, and kept at the right temperature, and skimmed at the proper time. 4th, the cream must be churned when new, not forgetting also that for churning a certain temperature is required to obtain the best butter.

To follow butter making successfully through the entire summer, requires the utmost skill and judgment. Where this branch of dairying is to be followed, a proper place to set the milk should be provided. This room may be situated above ground, and having, if possible, three of its sides exposed to the air, in order that we may the better control the heat and cold, by proper means of ventilation. As a matter of course everything must be kept clean and neat about the surroundings. It should be double boarded, and well plastered within, in order that sudden changes in the weather may not be as quickly communicated to the milk. A piazza of sufficient depth, to keep the sun from striking the sides of the building, would be a desirable addition. With every precaution which I can adopt, I have been unable, in hot days, to keep the milk sweet long enough to obtain all the cream.

In order to overcome this difficulty "milk coolers" of different styles have been devised. At the New York State Fair, which I had the pleasure of attending last autumn, I noticed several of these on exhibition, accompanying each of which

were very favorable recommendations from those who had used them, in the butter dairies of that State.

From my own experience I can say nothing as to their practical value, but it is my intention to test their merits for myself, during the coming season.

The only thought of those people who make only a small amount of butter, as well as of those who make it but a part of the year, seems to be to provide the coolest possible place for their milk. This is well enough during the hottest summer weather, but during the cooler portions of the spring and fall, a moderate amount of heat is necessary, since too much cold is as injurious in preventing the rise of cream as too much heat. For this reason I am satisfied that a large amount of butter is always lost by this class of farmers, for the lack of a properly arranged room in which to set their milk, where the temperature may be kept high enough to induce all the cream to come to the surface.

We found it necessary to warm our milk room until nearly the first of July, with the exception of a few of the warmest days in May and June, and resumed warming it nights and mornings early in September. A proper amount of heat has much to do in giving to the butter the desired color.

A very dry atmosphere, as well as a current of air blowing upon milk, is very injurious to the butter-making qualities of the cream. Cream, when dried, cannot yield as much butter as when soft, for the reason that whenever dry and soft cream are churned together, the butter globules contained in the soft cream break sooner than those of the dried, and thus while, to all outward appearance the butter has all come, much is still floating in the buttermilk and is lost.

There should be sufficient ventilation to carry off all steam which may arise from the milk while warm. To accomplish this the current of air should be admitted as near the ground as possible, by means of suitable openings, and, in order to regulate this current, movable shutters should be attached. A ventilator leading from the top of the room to the open air is also needed. In arranging the room, slats rather than shelves should be used on which to set the milk. We hear the setting of milk in deep pails highly recommended by some, but from my own experience I can say nothing in regard to it.

The sweetest and best flavored butter is undoubtedly obtained from milk which is allowed to stand only twenty-four hours, but we cannot get as much as when the milk stands longer.

In order to satisfy myself as to the proper time for milk to stand before skimming, two trials, of a week each, were made during the month of December, from which I obtained the following results: During the first week the milk was allowed to stand thirty-six hours. The amount of milk for the week was 1,493 lbs. or 678 quarts,—$2\frac{1}{5}$ lbs. to the quart. From this milk 69 lbs. of butter were made, or an average of 1 lb. of butter for every $9\frac{5}{6}$ quarts of milk. The second week the milk was allowed to stand but twenty-four hours, and the following was obtained: The milk weighed 1,296 lbs. and measured $589\frac{1}{2}$ quarts, and from this amount 51 lbs. of butter were made, $11\frac{1}{2}$ quarts of milk being required to make a pound of butter. Thus we cannot afford to skim the milk in twenty-four hours when the weather is favorable for butter-making, unless it is our intention to make cheese at the same time.

As a general rule, thirty-six hours seems to be, under all circumstances, the proper time for milk to remain before skimming. Whenever the weather is hot and sultry, however, we must of necessity skim sooner, but the cream should not be allowed to remain longer on the milk, even in favorable weather, as it will become bitter, and when churned imparts a like flavor to the butter. The right temperature is about 62°, but if the animal heat can, by any method, be quickly removed from the milk, a considerably higher temperature may be preferable.

In order to test the comparative merits of deep and shallow setting, we placed three pints of milk in some pans, and five pints in others. The same number of quarts were set in the shallow as in the deep setting, but the former produced but 22 lbs. of butter, while the latter gave $23\frac{1}{4}$ lbs., a difference of $1\frac{1}{4}$ lbs. in favor of the deep setting.

Cream should be churned in summer at a temperature of 56° to 58°, but for churning in winter it must be raised to 60° or 62°. No one should commence churning unless he knows exactly the temperature of the cream, as butter will not come without much unnecessary labor unless the cream is of the proper warmth.

Although it may be out of place to speak of a particular churn

in this general essay upon the management of the dairy, yet I trust that I may be pardoned when I say that it is constructed on a new and entirely different principle from any which I have ever seen, and that, after using it for an entire season, I can say that it has in every case given perfect satisfaction. Its principle is simple, its construction durable, and its arrangement peculiarly adapted to the wants of dairies of considerable size, while it is operated with the least power of any churn which I have ever tried. It is called "Bullard's Oscillating Churn," and was invented by E. W. Bullard of Barre, the patentee of the well-known "Bullard's Hay Tedder." Its movement, as the name oscillating would imply, is that of a crank motion, run by a large balance-wheel, which greatly assists in the operation of churning. The inventor does not claim for it as quick time as is claimed by many other churns, but I can say from my own experience that it churns in as quick time as the cream from different cows should be churned in order that all the butter may be saved. I would add that I have no hesitation in saying to dairymen keeping ten cows or over, that it is the best churn that I have ever used or seen.

After removing the buttermilk, I wash the butter with three different waters in order to wash out all buttermilk which may remain.

The butter is then taken from the churn and salted by weight according to the wishes of the customer. Butter which is to be kept for a considerable time must be salted an ounce to the pound, but for nice table butter the market generally wants less. We use only one-half an ounce to the pound, and could not easily dispose of it for a good price were it salted more.

For one week in each month during the past season I have carefully tested the quality of my milk in order to ascertain how much was required to make a pound of butter,—the milk of the whole herd, consisting of high-grade Shorthorns, being taken for these tests. The following is the result for each month:—

Number of quarts required for one pound of Butter.

1871.—In	March,	12.5 qts.
	April,	12.4 "
	May,	12.0 "

1871.—In June,	. . . . .	12.0 qts.
July,	. . . . .	12.2 "
August,	. . . . .	15.0 "
September,	. . . . .	12.0 "
October,	. . . . .	11.7 "
November,	. . . . .	11.5 "
December,	. . . . .	9.8 "
1872.—In January,	. . . . .	10. "

And now, in conclusion, let me say that I have left it to the man of science to explain whatever of science there may be interwoven with my subject. In this which I now submit for your consideration, I have given but those bare facts obtained by the practical experience of many years. And were it not for the fact that we owe something at least to our practical farmers as well as to our scientific men for whatever of agricultural knowledge we possess, it would be with still greater hesitation than now that I present this essay on behalf of your Committee for the consideration of this Board.

JOHN T. ELLSWORTH.

The essay was laid upon the table when the Board adjourned.

THIRD DAY.

The Board met at 10 o'clock, A. M., Hon. Marshall P. Wilder in the chair.

Present: Messrs. Allis, Baker, Birnie, Boise, Brown, Bucklin, Clark, Converse, Davis, Fay, Fearing, Goodman, Hadwen, Hubbard, Hyde, Knowlton, Leavitt, Loring, McElwain, Miles, Moore, Peck, Phinney, Root, Saltonstall, Slade, Sturtevant, Stockbridge, Stone, Washburn and Wilder.

Mr. Hubbard, Committee on Credentials, submitted the following

REPORT.

The Committee on Credentials have attended to the duty assigned, and respectfully report that the following members are duly elected:

By the Essex Society,	. . .	GEORGE B. LORING.
Middlesex South,	. .	JOSEPH N. STURTEVANT.
Worcester,	. . . .	O. B. HADWEN.

By the Worcester West, . . .	Thomas P. Root.
Worcester North, . . .	Eugene T. Miles.
Highland, ...	Jonathan McElwain.
Deerfield Valley, . . .	Roger H. Leavitt.
Bristol, ...	Avery P. Slade.
Plymouth, ...	Charles G. Davis.
Nantucket, ...	Andrew M. Myrick.
Appointed by the Executive, . .	James F. C. Hyde.

Signed, Newton S. Hubbard, *Committee.*

Messrs. Goodman, Clark and Birnie were appointed a committee to select and report upon a list of subjects for essays, and committees to which they should be referred.

Messrs. Stone, Fearing, Slade, Peck and Hubbard were appointed a committee to consider and report upon the time and place of holding the country meeting of the Board.

Messrs. Moore, Fay, Peck and Goodman were appointed a committee to report the assignment of delegates to attend the county exhibitions. It was

Voted, To limit the number of the committee to visit and examine the Agricultural College to three; when

Messrs. Leverett Saltonstall, Andrew J. Bucklin and S. B. Phinney were constituted the committee for the present year.

Mr. Clark presented and read a report as delegate to the exhibition of the Martha's Vineyard Society.

Col. Wilder presented the following essay upon

FRUIT CULTURE.

The undersigned respectfully reports that nothing of an extraordinary character in regard to fruit culture has occurred during the year 1871. In accordance with the general law that excessive production is always at the expense of succeeding crops, the crop of apples and pears of the year 1871 has been small, the natural result of the overbearing of the trees in the previous year.

The attention given to small fruits, especially the strawberry, is constantly increasing, and has already become not only an important but a profitable branch of culture. This is one of

the specialties which our cultivators are adopting, and in which they compete successfully with richer soils and more favored agricultural sections of our country,—a system which we believe must ultimately prevail in Massachusetts of cultivating those crops more generally, which are best adapted to our markets.

Among the lessons of experience which the Committee have learned, they would submit the following, as opinions which are now received and generally acknowledged as correct.

THE INFLUENCE OF WARM, DRY SEASONS.

The observations of the last few years, under the influence of warm, dry seasons, would appear to have established the principle that such weather (without excessive drought), especially in the earlier part of the summer, is more favorable to the perfection and ripening of fruits, particularly grapes, than cold, wet seasons. The fact is prominently shown in California, as we have witnessed by personal observation ; and is especially to be seen in the cultivation of the grape there, and also in Europe, and in our Northern States, where, under the influence of such seasons, neither the vine nor its fruit is affected by disease of any kind. These conditions we have noticed are also peculiarly advantageous for the formation of fruit-buds, and the storing up of the necessary perfected food for a future crop, and for the ripening of the wood, so necessary that it may endure the winter with safety.

DRAINING OF FRUIT LANDS.

In conformity with the foregoing remarks, we see the importance of thorough *draining* of our fruit lands, which produces in soils not naturally possessing them the conditions of warmth and dryness which we have named, thus rendering the condition of the earth, in respect to warmth and dryness, analogous to that of the air, of the importance of which we have before spoken. Besides these advantages is the thorough aeration of the soil, whereby it is enabled to absorb fertilizing matter from the atmosphere, rain, and snow, and the moisture evaporated from the springs below.

PREPARATION AND CULTIVATION OF THE SOIL.

It seems scarcely necessary in this presence to say that thorough preparation and enrichment of such soils as are not already rich is essential. Ordinary farm culture will not produce the highest class of fruits; they must have garden culture, and with this they never fail. After this thorough preparation, the cleaner the culture the better, and this should be shallow, so as not to injure the roots, but to preserve them near the surface.

MANURES, AND THEIR APPLICATION.

The subject of manures is a most important one, and every year becoming more so. The supply of manure in this State is unequal to the demand, and every year increases the disparity. What would be our feelings if the supply of wheat, on which we depend for our daily bread, were inadequate to the demand? Yet men are not more dependent for life upon their daily bread than are our fruit crops upon the food which is supplied to them in the form of manure of one kind or another. To supply this want we shall be compelled to rely in great measure upon artificial fertilizers, and chemistry has not yet taught us, as it will doubtless in the future, how to supply the wants of our fruit crops with certainty and abundance. But we cannot too often or too forcibly impress upon the minds of all cultivators the sacred duty of saving every particle of fertilizing material, and applying it in such manner as will produce the utmost effect. And on this last point the lesson which experience has taught us is, that manure applied to fruit-trees should be either in the form of a top-dressing, or as near the surface as is consistent with the composition of the soil and the preservation of its fertilizing elements.

MULCHING.

While on this subject we will add as another of the lessons of experience, which may be said to be fixed, the advantage of mulching for dry seasons and soils, whereby the temperature and moisture of the soils is kept uniform, and the fertilizing elements in a soluble state, an essential condition for the production of perfect fruit.

THINNING OF FRUIT.

This is another lesson which we have learned, and the necessity of which we have often endeavored to impress upon cultivators, and which every successive season teaches with stronger emphasis. It is absolutely necessary for all who send fruit to market to send large fruit, and the markets are constantly and progressively requiring large and fine fruit. Even the Seckel pear, which once commanded in Boston market the highest price, will not now, unless of extra size, sell for any more than, if as much as, common varieties of larger size. A medium-sized fruit, or even one of smaller size, may be more economical for use, but until some decided change in the preferences of the majority of purchasers shall take place, large fruit will sell better than small. To produce this, the fruit must not only have good cultivation, but must be thinned. We may lay it down as a certain rule, as has been stated, that excessive production is always at the expense of both quantity and quality, if not in the same season then in succeeding ones; for when branch is contending with branch, leaf with leaf, and fruit with fruit, for its supply of light and food, it would be indeed an anomaly in nature if this should not result in permanent injury to the trees as well as to the annual crop.

SHELTER.

The necessity of shelter was not as soon perceived as some of the other lessons which we have named; yet, with perhaps the exception of a few favored spots, its importance is year by year becoming more generally appreciated. The removal of forests diminishes the quantity of rain, increases the evaporation of moisture, reduces the temperature, and subjects our fruits to greater vicissitudes, so that the peach and many of our finest pears do not succeed as well as formerly, except in gardens or sheltered places. The importance of shelter was well understood as long ago as the time of Quintinye, the celebrated gardener of Louis XIV., who, in his work on gardening, gives full directions for planting trees for shelter: This was in a country long settled and denuded of its forests; and though our ancestors, planting fruit trees in a virgin soil, thickly covered with wood, failed to perceive its necessity, we, in our older

States, who have come to much the same conditions as existed in the time of Quintinye, experience the same want.

INSECTS AND DISEASES.

The subject of insects and diseases is daily attracting more attention, for their depredations are daily becoming a greater evil, and the importance of entomological investigations is every day more plainly seen. It is only thirty years since Dr. Harris first published his work on "Insects Injurious to Vegetation," and great is the debt of gratitude which we owe to him and to the succeeding investigators who have given their lives to studying the habits of these little "creeping things which be upon the earth," that they may teach us how to destroy those which prey upon our trees, and to distinguish our friends from our foes. Every plant imported from abroad brings with it a new insect or disease, and the dissemination of new plants and varieties, without which there can be little progress, inevitably disseminates their insect enemies. On this subject the words of Edmund Burke are appropriate: "The most vigilant superintendence, the most prompt activity, which has no such day as to-morrow in its calendar, are necessary to the farmer;" and we may add, still more to the fruit-grower, and tenfold more necessary in combating our insect enemies. The neglect of battling with these vile creatures is the great bane to successful cultivation. As long as moral evil exists in the world, so long may we expect there will be evil in the natural world, and he who is not willing to contend against both is not worthy of the name either of cultivator or of Christian.

These insect plagues can be exterminated, or be subdued, so that no material harm shall be caused by them. We have discovered means for preventing the ravages of the currant-worm, curculio, canker-worm, caterpillar, melon-bug and aphis, and the mildew and other diseases of our vines. If we can do this, is it not reasonable to suppose that we can discover remedies for, or the means of preventing, all the diseases and depredations that vegetation is liable to?

But some one replies, Let nature do all this, let nature perform her perfect work. True, but nature brings us weeds, thistles and thorns, insects injurious to vegetation as well as those that are useful; and we were placed in this world, not merely

to assist nature, but to meet with and overcome the obstacles which she sometimes places in our path.

For the Committee,

MARSHALL P. WILDER.

The report was accepted and laid over under the rule.

Voted, To appoint a committee of three to consider and report upon the time of holding the exhibitions of the Plymouth, Bristol, Bristol Central, Marshfield, Hingham and Norfolk Societies.

Messrs. Stockbridge, Hubbard and Peck.

Voted, To appoint a committee on printing.

Messrs. Fearing, Knowlton and the Secretary.

Dr. Loring submitted reports as delegate to the Worcester West, Barnstable and Middlesex South Societies.

Mr. Fay, on behalf of the Examining Committee, submitted the following report on the

MASSACHUSETTS AGRICULTURAL COLLEGE.

The undersigned, appointed by this Board a Committee for the Visitation and Examination of the Agricultural College, for the year 1871, beg leave to submit the following

REPORT.

The several members of the Committee, with the exception of Professor Agassiz, have attended the examinations of the College at the end of each term during the year. On account of ill-health in the early part of the year, and an absence from the country the last part, your Committee were deprived of Professor Agassiz's presence and counsel at the several examinations, except at the annual examinations in July last. It may not be improper to state that his unexpected presence on that occasion, was not only a source of the highest gratification to your Committee, but unmistakably a powerful stimulus to the exercises of the College.

Some of your Committee commenced their official connection with the State Board of Agriculture at the beginning of the

past year, and it was with some misgivings that they undertook the discharge of the duty assigned them by your Board,—a duty which had for its object the careful and close examination and thorough investigation of the management and success of an institution which was nurtured by the State, and which was beginning to be, if it had not already become, second to none in the position it occupied, and in the encouragement and good will which it was receiving from the citizens of this beloved Commonwealth. And more especially was the responsibility which had thus been imposed upon us, the more forcibly impressed, when we remembered at the outset, that the year over which our duties extended was to be the most important one, so far as the interests of the College were concerned, that had occurred since its foundation. The term of four years was about to expire. The first graduating class of an institution which by very many had been regarded as a doubtful experiment was to be sent forth as an "advertisement," both at home and abroad. What had before been but an experiment, was this year to become a reality—or a failure. The old adage "by their fruits ye shall know them," was this year to be made impressively truthful as regards the past success and the future welfare of this institution, through the agency of those young men of the graduating class, who were to go forward into their several fields of labor either richly laden with the results of an agricultural and scientific education, received at an institution supported by the generous benefaction of this Commonwealth, and thus proving the wisdom of its founders, or else *found wanting* when "weighed in the balance," and thereby stamping a stigma upon the College, and causing discouragement to its friends, who had hoped so much and labored so well to promote its best interests. With these reflections impressed upon us, our first visit to the Agricultural College (which was at the close of the spring term), was anticipated with no small degree of interest to the Committee, and this interest was not in the least abated at any subsequent visit during the year.

Your Committee have endeavored to take particular notice of all that in any way helped to make the College what it *is* or what it *should be*, that they might be able to present to your Board as intelligent a report as the circumstances of the case would permit, that you might the better judge what compensa-

tion the citizens of this Commonwealth were receiving, and what were the guarantees for the future from that institution, which was now so cheerfully receiving your fostering care.

The examinations of the several classes in the recitation rooms were attended by the Committee at the close of each term, and while they do not deem it necessary to refer to each class particularly, there was one feature so manifestly prominent in nearly all, that we regard it as a fact worthy of particular notice, to wit: "each student was taught to think for himself"; the student in some branches being compelled to pursue the investigation of the subject without the aid of any text-books; and, in the judgment of your Committee, if the success of any one department was greater than another, it was largely indebted to this cause, as infusing more life and zeal in the professor, and a wider scope of thought, greater independence and proficiency in the pupil; and while we would not recommend the absolute abandonment of all text-books, we would suggest that, if less reliance were placed upon "text-books," and the students compelled to search the great "book of nature" for ideas and scientific truths, we should have stronger and better men,—men of more enlarged views of life, and practically better fitted for the great work entrusted to them; having derived their thought and founded their judgment not upon the opinions of other men, but upon the great scientific truths which they had garnered from science itself.

The course of study pursued in the several branches is so minutely defined in the report of the trustees, that we do not regard it necessary to enlarge upon it. We have noticed with great pleasure, the efforts of the several classes in rhetoric at the close of each term, and feel justified in saying that in our judgment they would compare favorably with those of any institution bearing the name of college within the Commonwealth. We have been the more gratified in this, because we believe that while the main object of this institution *is* and *should be* to provide a thorough course of instruction in the science of agriculture and those sciences more immediately connected with it, yet the value and importance of self-possession and self-reliance, obtained only by a constant use and careful culture of the oratorical powers, cannot be overrated; for, after all, it is to be the

most effectual medium through which the value of the collegiate education is to be made known to the world.

The power of communicating and transmitting ideas with the human voice in an interesting and impressive manner, is one of the greatest gifts bestowed upon man, and its culture in an institution like this should not only be encouraged, but carefully guarded and earnestly recommended.

The graduating class, consisting of twenty-seven members, acquitted themselves with great credit in their several examinations and graduating exercises. Their uniformly gentlemanly bearing and manly appearance were noticeable in a marked degree. No one could look upon that company of young men without realizing the wisdom and foresight of those minds that originated the idea of requiring "military tactics" to be taught in agricultural colleges. The influence of their military training was so manifest, not only upon their general physical health and development, but also in those indispensable attributes which help make a true gentleman, that we do not believe too much importance can be laid upon this branch of their education, both as exerting a healthful influence upon the students themselves, and as a safeguard for the protection of our country in the future.

We regard the professors in the several departments to be eminently qualified for the work assigned them,—earnest, zealous workers for the interests of the College; and no one more so than the honored President, whose very being is inseparably connected with the best interests of the College and farm. Fortunate indeed that its management has fallen into so able hands.

We are happy to say that the recommendation of your previous committee relative to the establishment of a professorship of veterinary science has been heeded, and such professorship has been established, an appointment made, and the science will hereafter be thoroughly taught.

The farm itself has been examined with considerable care, with a view of determining what was the mode of farming adopted, and the practical result to the College and community of any experiments that may have been tried for the purpose of ascertaining what crops to raise and how to raise them, so that they should return the greatest profit to the producer.

The farming has been under the immediate supervision of

John C. Dillon, the Farm Superintendent, a gentleman admirably adapted to his work. The destruction of a part of the farm buildings by wind, the year previous, caused the necessity of erecting a large number of sheds for the protection of the cattle, sheep and swine, and the superintendence of the erection of these sheds unavoidably demanded the personal attention, labor and constant oversight of the Farm Superintendent for a large part of the season, so that his attention was diverted from the farm much more than it otherwise would have been. The principal attention paid to the farm the past year has been in raising and harvesting the ordinary crops, with, perhaps, a single exception. The raising of the "sugar beet" has received considerable attention, for the purpose of testing the expediency of making it an agricultural enterprise in this Commonwealth. The results of the experiment will be in detail before you, in the report of the trustees, who have, through eminent professors and chemists, tested it thoroughly. Your Committee are satisfied from personal observation that the "sugar beet" is a profitable crop to raise for feeding purposes, and that sugar of the finest quality can be made from it. Whether the manufacture of sugar can be made profitable in Massachusetts we have no means of judging advisedly and express no opinion.

We are informed that the products of the farm the past year, are as follows, to wit:—

	Acres.	Roods.	Poles.
226 bushels of potatoes, gathered from . .	3	–	15
160 bushels of oats, gathered from . .	4	1	9
840 bushels of rutabagas, gathered from .	2	–	–
300 bushels of white turnips, gathered from .	–	–	–
59 tons of sugar beets, gathered from . .	4	2	33
1,300 baskets of corn in the ear, gathered from	10	2	20
15 tons of Hungarian grass, gathered from .	12	–	–
125 tons of hay, gathered from . . .	133	2	–

The horticultural department has become one of the most attractive features of the College. The very liberal donation it has received from Dr. Durfee, places it in a very substantial

condition. The influence upon the students can but be of a healthy character. It cannot well be dispensed with, and should receive the attention its importance demands.

The farm buildings, including the barn and sheds, are now in very fine condition. The erection of the sheds already referred to supplies a much-needed demand. They are constructed with a view of providing for the comfort of the animals, and great convenience in their care; and although not entirely completed at the last visit of the Committee, yet they had so far progressed towards completion as to indicate their value.

The labor about the barn in the care of the stock, we were informed, was principally performed by the students, and evinced care and economy in its management.

The live stock generally was in good condition, consisting of nineteen swine and seven horses, and about sixty head of cattle, largely of thoroughbreds, and representing seven different breeds.

We, however, would suggest that this branch of the agricultural part of the College is one which requires in its management great skill and sound judgment, and in our opinion the selection and breeding of stock for the farm should be entrusted to the care of *one man* who is thoroughly acquainted with his business, and who from his experimental knowledge is able to determine what particular breeds and crosses are the most profitable; and especially so that when he is convinced that a particular breed or animal is unprofitable for the farm, he may have full power and authority to discard it and introduce others in its place.

The experiences of stock raisers in different sections of the country have been so varied, owing to the difference in climate, quality of food and various other causes, that no general and fixed rule has been or can be adopted which seems wise or safe to follow. Hence the necessity of placing the care of so important a branch, and one upon which so largely rests the reputation of this institution, in the hands of one who himself personally is able to trace the history and results of his experiments in this regard from day to day.

We are gratified that so much care has been already taken, and that recently a new interest has been awakened in this re-

gard, and we are confident, if continued in the hands of the present manager, unprofitable stock for the farm will not long be tolerated.

The farm already begins to show the beneficial results of underdraining, a large tract of mowing land having been by this means reclaimed, so that from comparative worthlessness it has become a source of great income.

The old and worthless apple-trees on the farm have been removed, and an orchard of the different kinds of fruit, sufficient at least to supply the demand upon the farm, has already been planted.

The raising of the grape in Massachusetts is no longer an experiment but has proved to be a very profitable investment, and the universal acknowledgment of this fact warrants the Trustees of the College in making large provision for its culture, a well-located vineyard of two acres having been planted. There can be no reasonable doubt of its success.

The more immediate wants of the College at the present time, seem to be more enlarged accommodations for pupils, and also some means to reclaim the pasture land which, to a great extent, is at present in an unprofitable condition.

We can hardly expect that an institution still in infancy would have arrived in this short time to that degree of perfection, that it presents no material for the critic.

Your former Committee suggested that the College should possess a "working farm," in which we fully concur; and it cannot be expected that all the rough places will at once be smoothed, or the unfertile spots reclaimed. It must necessarily be the work of many years. What we have a right to expect, and all that we can reasonably ask, is that the best use should be made of the liberal provisions in its behalf that can possibly be made, so that the success achieved by the triumphant victory of the students of the College in their late trial of "muscle," shall be simply emblematical of that greater triumph which in the future awaits the representatives of the Agricultural College, when they shall enter the race for a trial of "brain and muscle."

We congratulate the State Board of Agriculture upon the eminent success which has thus far crowned the efforts in behalf of the Agricultural College. Let its friends continue to be

mindful of, and watchful over its welfare. Let no unjust criticisms be allowed to pass with impunity. Let the hands and hearts of the faithful professors and trustees be supported and encouraged, and the time is not far distant when there will be one universal song in favor of the Massachusetts Agricultural College.

F. F. Fay.
N. S. Hubbard.
John Johnson.
Wm. Knowlton.

The Report was accepted, when it was voted to take from the table the Essay on the

MANAGEMENT OF THE DAIRY.

A motion to adopt the report led to the following discussion:—

Mr. Goodman. The report was long and interesting. I understand it is to be published, and until we see it in print we shall not be able to ascertain fully its merits, and the objections to it. I believe we all know the system called the Barre system, and the character of the dairy work up there, but there are one or two matters in the report which I should like to inquire about, as they are of considerable importance to us as farmers: one is the length of the flooring for cattle. If I understand Mr. Ellsworth aright he thought the planking for cattle should be as long as the cattle. What length did you give?

Mr. Ellsworth. I gave a length of four feet nine inches, or any length so that the whole heft of the animal when down will rest upon it.

Mr. Goodman. So that the manurial matter will drop off behind. Another point was, Mr. Ellsworth thought there should be a little slope. Is there any necessity for having a slope for cows? It may be necessary for steers and bulls, but do not cows lie a little better if the planking is level?

Mr. Ellsworth. I shouldn't want it to slope towards the head at all, I should prefer to have it slope a little to the rear, I did not give the amount of pitch, except very little.

Mr. Goodman. I understand you it was better to lay the planks with the grain than across. If laid with the grain I find

they become slippery, and when laid across the grain I find that does not take place.

Mr. ELLSWORTH. I should prefer to have short plank, and sift a little sand on the floor if necessary to prevent slipping. It is much easier to renew the planks.

Mr. GOODMAN. If there is sufficient bedding of course that is not necessary. I think my experience will be found to be the experience of a good many farmers, that where planks are laid across slipping does not occur, grooves do not wear in them so easily.

One other point which Mr. Ellsworth touched upon I did examine into; and that is, putting milk into deeper pans. After our fall meeting I visited Col. Waring's dairy. I find he keeps a very fine breed of Jerseys, and a large number of cattle, making butter principally for the Newport market in the summer, and more or less for the Boston market in the winter. His pans are made on an improved German principle, and they are about six inches in diameter, if I remember rightly, by eighteen inches deep, and they were immersed in running water. Instead of taking for his large number of cows about twenty or thirty pans, I think the milk was all put in about half a dozen. While I was there he skimmed the cream from one by means of an ordinary dipper, and the cream that came up at that time by measurement, I think, was nearly two inches deep. So far as I could learn from him, he did not find that there was any increase of cream by this process, but he thought the butter made from it a little more uniform in character, and he thought the expense of having a few cans instead of having so many was less, and upon the whole it was less trouble. He had a cellar made for the purpose, where the temperature was kept the same both winter and summer, with water always running through from a spring, and the pans were kept in that all the time. He did not get more cream, but he thought he got it more easily, and with less trouble. I understood him to say he got as much. Of course this is a matter for experiment, and those of us who have running streams of water can very easily try it.

QUESTION. Did he try a certain number of quarts of milk each way, and see which took the most quarts to make a pound of butter?

Mr. GOODMAN. No, sir; but he is a writer on this subject as

well as a practical agriculturist and man of science. Everything that is done on his farm is generally done by weight and measure. He keeps an accurate account of what is sold, and all that. I understood him that the amount of butter obtained from the same number of cows did not differ materially under the two systems, but he thinks the quality was a little better under the latter.

QUESTION. Did he keep the temperature the same the year round?

Mr. GOODMAN. Yes, sir.

QUESTION. I should think he would have to keep the temperature warmer in winter beeause the water is colder than in summer.

Mr. GOODMAN. Spring water is about the same temperature all the time.

QUESTION. What was the depth of the pans?

Mr. GOODMAN. About sixteen or eighteen inches I think.

QUESTION. I think spring water brought in aqueducts varies very much in temperature.

Mr. GOODMAN. I don't think there was any fire introduced; it was down in a cellar where it is supposed to keep nearly the same temperature; I am not so certain about that. I merely mention this for the consideration of the gentlemen engaged in butter making.

ALBERT FEARING. I understood the gentleman to say in his report that he usually dried off his cows about five weeks previous to calving. I should like to ask if eight weeks is not better?

Mr. ELLSWORTH. It is nine weeks in the report; I think you misunderstood me.

Mr. FEARING. I should like to ask, if roots are fed immediately after milking whether the milk will not invariably taste of the roots? Suppose you give them cabbages, or some of the strongest of the roots, in no case will the milk taste of them?

Mr. ELLSWORTH. I think I said where they were fed immediately after milking they invariably did not impart any unpleasant flavor to the milk or butter. That is my experience. I have fed cabbages and flat turnips just after they were pulled from the ground to my cows, and the butter has come to this market. Probably most of you know Mr. Hovey, and if it had not been

good he would have detected it. I have no doubt if they were fed half an hour before milking the milk and butter would taste of them.

Mr. FEARING. In regard to the amount of milk required for a pound of butter,—twelve quarts I think the report stated; down in our part of the country we find that nine quarts on the average will make a pound of butter; that is, milk from Jersey cows.

Mr. ELLSWORTH. As I stated yesterday, it is very important, if you have anything to report, to report it as it is. I reported it as I found it. I gave the stock it came from and the butter that was produced, under all circumstances, and at all times of the year. Now you will notice that this was given in July and in August, but the reports that we get in the newspapers as to how much milk it takes to make a pound of butter are not all satisfactory to me; they are given mostly in the butter-making months, not in August, or in each month through the year. I have no doubt myself but that the Jersey cow is preferable to make butter from; but as to the quality of the butter made from the Jerseys being better than that made from other breeds I have my doubts. I should like to hear from Mr. Flint on that point. His is as good authority as we have in this country on dairy cows and milk and butter, and what it should take through the season to make a pound of butter.

Mr. FEARING. I milked last season ten cows, mostly pure blood, some grades, and we found that on the average nine quarts of milk would make a pound of butter. I should like to ask if different kinds of feed would not make a difference. For instance, we have in our town what we call low ground, not exactly meadow, and we find that the milk of the cows feeding there is quite inferior to the milk of the cows that feed upon our high land. It has made a very decided impression, so much so that two or three farms there have the reputation of having poor milk. Even if the cows are Jerseys they find it changes the milk. I would ask if these gentlemen have had any experience in that way. This grass is English grass, not what we call meadow grass, but it grows on low land where the fog lies in the morning.

Mr. ELLSWORTH. That is my experience, and it has been considerable on that point. I have found invariably when my

cows run where there is a large abundance of fresh feed that the flow increased, but the quality was not near as good for making butter. The milk was richer, and I could make more butter, from milk obtained from a small amount of good feed, than I could from a large amount of feed of poorer quality. It is so in winter as well as summer: when we give a poorer quality of feed, and work in straw and meadow hay, the milk and butter are poorer in proportion.

Mr. ALLIS. Mr. Ellsworth stated in his report that for a few days after a cow had calved he prevented the calf from bunting the udder from fear of injury to the cow, and then after that he allowed it to bunt as much as it chose. It has appeared to me in my experience that if a calf bunts the udder it injures the cow even when you are fattening the calf. In speaking of milk, there have been experiments in our dairy, and we have made sixty ounces of butter from twenty quarts of milk from an Ayrshire cow. The experiment has been tried repeatedly, and all the feed the cow had was what hay she wanted and two quarts of meal.

Mr. ELLSWORTH. I think I stated that if the calves were allowed to bunt the udder while there was any inflammation, it would be very apt to injure the cow; but if the bag was perfectly free from any inflammation, I have never found any trouble whatever.

Mr. ALLIS. I should like to ask Mr. Ellsworth if he has any difficulty in getting a cow with calf from one season to another.

Mr. ELLSWORTH. I have had a good deal of difficulty in that way.

Mr. ALLIS. Can you tell us of any kind of feed that will operate beneficially in that respect?

Mr. ELLSWORTH. I do not know as I should be justified in saying that any kind of feed will operate towards getting a cow with calf. My observation is, if a bull serves a cow in the earliest part of the heat, it will be more likely to be effectual. I have observed this more frequently where a bull runs with a herd of cows. Nature teaches them the right time. My observation has been that the cow receives the bull in the earliest part of the heat, and it is very seldom that she receives him more than once or twice.

Mr. ALLIS. There has been great complaint in our locality,

for two or three years, in regard to this matter, and at a meeting of the Harvest Club of the Connecticut Valley, in our town, some six weeks ago, one of the best dairy farmers in Conway said he had been troubled very much in this way for several years, until within the last year he was told by some one to feed his cows with bone-meal regularly. He has tried it for the last year, and he says that he has not had a single cow out of ten fail. I have adopted that plan within the last few months with my own cows. I give them about a great spoonful of bone-meal once a day, and I have had no trouble this winter at all in that matter.

Mr. HUBBARD. There is another very important matter in connection with what Mr. Allis has said. I should like to know whether there is any difficulty in different parts of the State in regard to cows losing their calves before the proper time. I know that last year I heard of twenty cows. I lost seven, and it was something that never had occurred before in my experience. This year, up to the time I came away, I lost four without any apparent cause whatever. If there are other members of the Board in different parts of the State suffering in this way, I should like to know it.

Mr. BUCKLIN. I should like to ask Mr. Ellsworth if he practises bleeding a cow or drenching a cow with cold water after she has taken a bull? I had a Durham heifer that would not breed, and finally I was advised to bleed her until she could hardly stand. I did so, and since that she has bred without any trouble. In regard to Mr. Hubbard's remarks, I will say that I lost a calf from a very choice heifer a few weeks ago.

Mr. ELLSWORTH. No; I never tried anything of the kind.

Mr. J. F. C. HYDE. Perhaps I may be pardoned for saying a word or two—though I am not a cattle man, and do not profess to teach any one here or any where else—in regard to this matter of butter, butter making and butter selling. I am interested in both, as I do not make all I need, though I intend to hereafter. I like the Jersey butter, and I was rather surprised at some remarks that the Secretary made in Vermont, as I saw them published. I am very particular about butter, and have bought it at high prices, paying from eighty cents to a dollar a pound for table butter, week after week, having Jersey butter

always. The point I wish to make, and I hardly need speak of it here, for no doubt all the gentlemen present have realized it as much as I do, is the importance of making good butter. Now, there is always plenty of poor butter,—hundreds of tons of poor butter in the market. If gentlemen go through Boston market, as I do year after year, in pursuit of good butter, not only for myself, but for my neighbors,—for they have an opinion that I am a pretty good judge of butter, having cultivated this matter of tasting to some extent in horticultural matters,—they would see that the quantity of good butter is very small; it is amazing how small it is in comparison with the amount of poor butter. I know a dealer who brings into this market hundreds of tons, and perhaps thousands of tons, and the way I manage to get good butter is this. In the autumn I say to these dealers from whom I have had my butter for ten or twelve years, select out of the best butter you bring here, four, five or six tubs, and send me up word. They will be a month perhaps before they get four or five tubs which they want me to look at. Then I go down, and perhaps I won't find a tub of really good butter, or at least butter that I should wish to put on my table. They say they are the best they have, and they have selected them out of tons. They will say: "Look at the quantity of butter we have there, yet there is not a tub of it you would take as a gift to put on your table." Then I say: "Set out the best that comes in the next few weeks;" and this year I was over two months getting my butter.

You may say I was very particular. I am particular enough to get good butter, and I did succeed in getting two or three tubs of very good quality. Now, it does seem to me that if the people of Massachusetts, and all over the country, realized how they suffered by this state of things (both sellers and consumers), we would speedily get better butter. Look at the difference: here I pay—and I presume others of you do the same during the summer months—eighty cents a pound for my butter, and I have paid as high as a dollar a pound. Mr. Sargent's butter sells for a dollar and a quarter a pound, and the butter made by other gentlemen sells from eighty cents to a dollar a pound, while medium butter brings only from twenty to thirty-five cents a pound. What makes this difference? It is largely due to the management in making up of that butter.

Now, is it not possible for people to make universally a better article than is now made?

Mr. Ellsworth tells us that certain conditions, properly observed, will give good butter, with now and then an exception. If certain rules may be laid down for making good butter, pray tell me why our people are making a poor article of butter almost universally, when a good article might be made? I do not find fault with the butter makers any more than I do other people, but the butter makers are blind more than other classes of farmers to their own interests, more than any other set of men. If they would make a better article of butter, it would find a more ready sale, and a much larger price would be paid for it than is paid at the present time.

Another thing is the shape in which it is sent to market. A great deal depends upon the way in which fruit, or butter, or any thing of that sort, is sent to market. If it is sent in good condition, done up in good shape, the farmer realizes more for it; three or five, or, perhaps, ten cents more a pound on butter, than he would if it was prepared in an indifferent manner for market.

The way our Barre friends send it, I believe, is in a box containing eight to twelve pounds, and I have once in a while bought it in that way. But if it is sent in lumps, it should be put up in an attractive way. People will pay a little more for a handsome lump of butter to put upon the table, than they will if it comes in a box, unless it is made into lumps at home, which is sometimes done.

The principal point I make, and which I wish to impress upon every body who makes butter, is to make better butter. If it is true that they have not good stock to make butter from, then they had better turn their attention to improving their stock. I sometimes think I should like to take the butter makers of New England and New York, and other places, who send their butter to the Boston market, and make them taste the butter they would find in the stores here; they would go back home determined to make better butter in future.

The best butter, it is said, comes from Vermont. I do not find it so. I find the best winter butter comes from New York State, and some of the best butter in summer comes from about Boston. To eat some of the butter that is made is worse than taking medicine; because when you take a dose of nauseating

medicine you make up your mind to it. Those poor fellows who have to dine at the hotels and restaurants in Boston, know what it is. I never touch the butter in them ; I cannot. I had rather go without. Their excuse is, that it is as good as the average butter in Boston ; that to get better they have to pay ten or fifteen cents a pound extra. Is there not some way to raise the standard of butter, so that we may have better butter in the market ?

Mr. STURTEVANT. The gentleman from Hingham asked a question in reference to the effect of the feed upon butter, and the answer to him was, that if certain food was given half an hour before milking, it affected the milk, and consequently the butter ; but if fed half an hour after milking, it does not affect it. That certainly is a matter of importance to everybody, because if we feed as he says, and that affects the butter so seriously, that is a matter which every gentleman at this Board wants to understand. It is the food that we give our cows at a certain time, as I understand it, which affects the milk, and induces bitterness in the butter, even if the utmost care is taken in making the butter.

Mr. HUBBARD. I have no doubt of the truth of the remark just made, that the food given to cows will affect the milk. But that was not the subject on which I wished to speak. I desire to refer to one point suggested by the essay of Mr. Ellsworth, and that is, as to the time which milk should stand before the cream is taken off. He said that milk standing twenty-four and thirty-six hours would give different results in the quantity of butter, but he said nothing about the quality. Now, I have been told that cream that was taken off of milk after it had stood twenty-four hours, if it was taken off separately could not be churned into butter. The question has arisen in my mind whether the little more cream that we got by allowing the milk to stand more than twenty-four hours, was not at the expense of the quality of the butter. It has been said that butter has been sold from 45 cents to $1.25 a pound. If the butter made from cream that is taken off in twenty-four hours is of a superior quality, is it not better to take it off then than to let it stand twelve hours longer, although we may get a little more cream, if the butter is to be of an inferior quality ?

Mr. ELLSWORTH. If you disturb milk after it has stood twelve

hours, the butter made from the cream that you get after that is never of so good quality as it would have been if the milk had remained undisturbed for twenty-four hours. You get the finest and best quality of butter in twenty-four hours, but I am satisfied you get more butter if you let it stand longer, and I have never been able to find anybody who could detect difference enough to make any difference in the price. I have no doubt that cream taken from milk after standing twenty-four hours, and churned immediately, before it has changed at all, will make the sweetest butter. When it has remained thirty-six hours, the cream is new, but it is not sweet. That is the time, I think, to make the best butter, when it is new.

Mr. HUBBARD. I had some experience in the Worcester Co. cheese factory, which was the first factory started in Massachusetts. We operated somewhat in the making of butter and cheese at the same time. We heated our milk with steam, and we applied the steam-engine so as to churn the milk and make butter from that. We made a very excellent quality of butter, but we found that we got a small quantity, and then the milk went right into cheese, which, to all appearance, was just as good as before; showing that the butter, when everything is perfectly sweet, is of excellent quality. We found this difficulty: that when so much liquid was churned, the amount of butter was so small that it troubled us to gather it well, and we abandoned the experiment.

Mr. HADWEN, of Worcester. In the essay of Mr. Ellsworth, he gave us the length of the stalls. It seems to me the better way is to make your stalls a little short, and then lengthen them according to the length of your cows, which you can easily do by putting down joist. You find that some cows need stalls from four to eight inches longer than others. And furthermore, if you have your flooring level, and then put down 2 by 4 joist on the back part of the floor, and fill the floor with bedding, that prevents the bedding from slipping back, and makes a very comfortable, dry floor for the cattle to stand on.

Now, in relation to bitter butter. There are various causes for that. If you feed your fodder with wormwood in it to cows in autumn, you will have bitter butter; and of course you will have bitter butter if you let your cream remain too long. Mr. Hyde has alluded to the poor butter which is made. There are

some farms which cannot produce good butter. I knew an instance in our county where a shrewd farmer, finding he could not make good butter at home, bought the farm of a man who was noted for good butter, and there he was successful;—but the man who had always made good butter, moved his stock and his wife to another farm, and he could not produce good butter—butter that would be satisfactory to Mr. Hyde or any one else. So there is a great difference in farms as to their capability to produce good butter.

Mr. Ellsworth gave a pretty large quantity of milk to a pound of butter, but I believe the Barre cows have not been bred for butter-making purposes, but for beef-producing and cheese-producing cows.

Mr. Converse. I would like to ask if there is any gentleman present who has ever practised churning milk. I have known persons in Vermont who churned their milk immediately after milking, and they said they produced sweeter and better butter, and got more of it, than by churning cream.

Maj. Phinney. That applies to persons who make their butter from a pint of milk.

The Chairman. A neighbor of mine churned his milk for a long time by an English machine, introduced for the purpose. He had some butter churned before a party of people who were invited to see it, and the butter was delicious. But he had to give it up for some reason—I do not know what.

Question. Were the cows Jerseys?

The Chairman. No, sir; grade cows.

Mr. Hyde. It was my fortune or misfortune to sell a herd of pure-bred Jerseys for Mr. Converse, at Southborough. Mr. Converse had bred for a definite purpose, and I think had succeeded well. The reason I speak of it is, that a great objection has been made to the Jersey cattle, because of their small size and their poor quality for beef. Now, Mr. Converse had bred with two or three things in view. First, for the best butter-making qualities, in which I think he had succeeded. And my reasons for saying that are these: first, I have eaten his butter, and I know it was good butter; second, I never saw better skins on animals in my life. Then he had bred with a view to size and roundness, and plumpness of form, which are not usually found in the Jersey. He had some bulls there, one of which, in par-

ticular, was as fine a bull as I ever saw in my life. He had secured cows of good size, pure-bred Jerseys, not grades,—I will not say large, but I say of good size,—which were not rough and bony in appearance, but well filled up, of good forms, and which gave excellent milk. He had started with that object in view; but unfortunately, before the experiment had been brought, as it seemed to me, to its highest degree of success, reverses in business compelled him to sell his stock. But I believe that he had started in the right direction, and certainly had made a great gain. But if it turns out to be true, as has been said in various directions,—and I seem to feel it in the air,—that the Jersey butter is not good butter, then of course this all goes for nothing.

Now, I have been foolish enough to believe that Jersey butter was most excellent butter, and have continued of that mind up to within a few weeks. But if it be true, that we are to abandon Jersey stock for butter-making,—and that has been their chief merit,—where are we to look for butter? I have said that New York butter is the best butter that comes into this market for winter use. It is not because they have the best breed of stock there, for I understand that they are largely Shorthorns and grade Shorthorns that are used for butter-making; it is because they have some of the very best grazing facilities there. They have some of the very best farms, and a large amount of white clover is used there, and it strikes me there is no better food to make sweet butter than white clover. Whether that be so or not, I find no butter in the market that has the color that the Jersey butter has; I find no butter in the market that has the flavor of the Jersey butter. It is fine, it is delicate—possessing a fine and delicate flavor. It seems to be *refined*, so to speak. It is not crude, like some of the butters, but it is fine, delicious butter. It is said that it lacks flavor, and I am obliged to acknowledge that it is not always as high-flavored as butter ought to be that looks so well as Jersey butter does. I have found New York butter that did not look so well that really possessed a finer and better flavor. What I want in butter is this: I want color—all the natural color you can get into it. It cannot be too highly colored for me, provided it is all natural. I want it, then, perfectly fine, smooth, not greasy. People laugh at me for talking about *greasy* butter. I want it so

that it will cut just right and not be greasy. I want it so that it shall not only be perfectly sweet, but so that is impossible to detect any foreign flavor in it. And I want it to possess a peculiar sweetness, that I can hardly describe. You can better understand it after you have gone into a flower garden and inhaled the fragrance of that. There is something that is indescribable, but you want to have that in butter. For summer butter, you want but little salt; for winter butter you want more. A great deal of butter is ruined by salt. Farmers think they make a little money on the salt they put in, for which they fancy they get a high price. The fallacy of that is shown in the fact, that when that butter is sent to market, they have to take off from three to five cents a pound, in consequence of this salt. That should be guarded against.

Now, what we want is, cattle that will make that kind of butter, if we have not got them. If they are not to be found in the Jerseys, where are they to be found? Are they to be found in the Ayrshires?

Dr. Loring. Yes, sir.

Mr. Goodman. To a small extent.

Mr. Ellsworth. Grades.

Mr. Hyde. I have not found these qualities in Shorthorns. I should not advise any man to go into Shorthorns as butter producers. Take the largest-sized and best-formed Jerseys you can find, and I don't believe there is a stock of cattle known to us that will give us butter of such uniformly good quality, or so much to a quart of milk. Gentlemen talk about twelve or fifteen quarts of milk to a pound of butter. I believe that with Jersey cattle you will not require over nine quarts to the pound, and you may follow it right through the season. I believe Mr. Converse gave me figures far below that, something like six and three-quarters or seven quarts to a pound of butter.

Now, such animals can be produced. It costs no more to feed them than others. Mr. Ellsworth feeds his cattle in the right way. Take care of them; make a business of it. Do not do it in the shilly-shally way that thousands of farmers do; but do it thoroughly, systematically, as if you meant to make a business of it. What I want is, to call the attention of the farmers of Massachusetts to the important point of producing

the best butter, that will bring the highest price in the market, and securing the breed of cows that will do it.

Dr. Loring. I did not hear Mr. Ellsworth's essay, but I think it must have been a very sensible and a very interesting one, because I find that almost every man who attempts to deal with it, starts off on his own account, but ultimately comes back to the essay itself.

There are one or two matters upon which I desire to make a few remarks. The first is, in reference to the flooring upon which cattle should stand. I think it should be as level as possible. Cattle and horses should stand on a level floor; if anything, the floor on which a horse stands should fall off at his fore feet rather than his hind feet. The fall for the water should be underneath the floor upon which the animal stands. If you are stabling cows, the fall of the water is provided for by nature; but if oxen or horses, the fall should be underneath the floor. The floor should be made open, in such a way that the water will flow underneath the floor upon which the animals stand, on to a sloping floor, down which it can fall. It is a very easy and simple thing to do. I mention this, because I have made a business of studying floors, and I am sure that many forms of lameness in horses are attributable more to badly constructed floors than to any other cause.

In regard to the animal which makes the best butter, I do not believe that there is any one special breed which will make what would be universally recognized as the best butter for market. I think Mr. Ellsworth need not be ashamed of his grade Shorthorns as butter-making animals. They give a large amount of milk, I grant, owing to the abundance of the feed they find upon the Barre pastures; but I know perfectly well that there are in Barre and other towns where grade Shorthorns are used, cows that are admirable butter cows,—good animals for every dairy pasture. It is so with the Ayrshire. If you put a grade Ayrshire, or an Ayrshire, or a grade Shorthorn, or a common native cow, upon a good pasture, especially adapted to the purpose of making butter, if she is a good cow, she will make a pound of butter from eight and a half to ten quarts of milk, or twelve, perhaps. I have myself a grade Ayrshire cow, fed on winter feed, that made a pound of butter from eight quarts of milk. These cows are not common, but they can be

found in almost every breed we know of. That the Jersey cows make a pound of butter from less milk than any other cow, except the Devon, I have no doubt. I think the Devon and the Jersey carry with their milk more of the butteraceous quality than any other class of animals we have. But the difficulty to which Mr. Hyde alludes, with regard to Jersey butter, grows out of the fact that it is so loaded with butteraceous matter that it is difficult to transport it. You will find a great many hotel-keepers, in various parts of this State, who complain of Jersey butter, which would be admirable could it be eaten upon the farm where it is made, but which, before it reaches the market, is utterly worthless. They complain that it will not keep as long as other butter will.

That brings me to the great point in this butter question—the difficulty in transportation. If Mr. Hyde lived upon a farm, and had a good, intelligent butter-making woman, or wife, or daughter, who understood exactly the old-fashioned mode of making butter, and it was taken from the dairy room to his table, he would find no fault with it; he would not know any difference between Orange County butter and Berkshire or Worcester County butter. If he could eat it in the place where it is made,—if it is made with care, so as not to absorb any noxious gases, or any of the odors that gather around a stable or cellar, (for butter absorbs everything with the utmost rapidity), he would find no difficulty in getting good butter. The difficulty is in transporting from one place to another. I know from experience that Mr. Ellsworth has good butter on his table. I know that before cheese factories came into vogue, he had good cheese on his table; how it is now, I won't undertake to say. But if a box of his butter were brought from Barre to Salem, and he should try it there, he would never recognize it as his own. I think it is hardly possible to get a firkin of butter fifty miles from the country, in the heat of summer, for instance, and have it come out exactly as it was when it started. The process of transportation, the agitation of carrying it from one place to another, the effect of changes of temperature upon it, the heat of summer and the cold of winter, the effect of placing it in a freight car, one or all of these causes have deteriorated its quality. Have we not heard, in old times, when we had no railroads, often with a sort of sneer, about "store butter"? The

difficulty was, that the butter had absorbed all the odors of the store, and there are those here who know that the odors of an old-fashioned grocery store were somewhat rich. It is the difficulty of transportation therefore.

Mr. Hyde says he makes a portion of his own butter; but those of us who purchase our butter must take it for granted that we must labor under the same difficulty as those who purchase their fruit and vegetables. You cannot get anything from the farm to market, and through the market into the mouth of the consumer, precisely as good as it is when it is used on the farm where it is grown. Everybody knows that vegetables brought from a distance are no more the vegetables they were when they started than chalk is like cheese.

Mr. Hyde. Can't we have a better butter?

Dr. Loring. We have more good butter than you think. The difficulty is in getting it from one place to another, and in getting it through the hands of the middlemen. We must, therefore, exercise our own ingenuity in selecting, or else return to the difficult and somewhat extravagant business, as some of us know, of keeping our own cows and making our own butter.

Mr. Hyde. That I am going to do.

Dr. Loring. I have made in different parts of Massachusetts, arrangements for the delivery of butter in the most rapid manner; but I never could get it from a farm in Western Massachusetts, for instance, into my own house in a perfectly good condition.

Now, in regard to feed. That is another thing we must submit to. We cannot have everything as we would have it. We cannot make a new pasture out of an old one. We cannot make all hay-mows alike, and meal gets heated going through the markets. It is the same difficulty which attends the transporting of butter from one place to another: the wonderful faculty that the animal economy has of taking up the flavor of different articles of food. It is so in the human system; it is eminently so in the domestic animals; and it comes in nowhere so readily and so rapidly as in those portions of the animal economy known as the milk and butter producing organs.

So we must expect to submit to these evils. We can, by exercising a little ingenuity, get rid of them in part. Feeding

roots directly after milking will, as Mr. Ellsworth says, prevent the flavor getting into the butter somewhat; but we cannot avoid it entirely; we must submit to it.

So in regard to other evils which have been alluded to here. The subject of cows losing their calves has been discussed. The whole medical corps of the State of New York undertook to investigate it, and they came to no conclusion except this: that there are almost as many causes as there are localities and herds. A little musty hay; a sudden change from one kind of food to another; putting cattle from meadow hay on to good pasture in the spring of the year; half starving them to death in winter. I have been taken into many a stable in New England, where, with tears in their eyes, the unfortunate owners would show me half a dozen young cows that had lost their calves in the month of January, and for the simple reason that they had been reduced to such a condition by short feeding, that they had not vitality enough to hold the fœtus. A sudden change of wind, a thunder storm, a brutal, vicious blow by a herdsman, a single ugly cow in a herd, any sort of mental agitation will cause it. A cow is as susceptible as any other female animal to all these influences; and when abortion makes its appearance in a herd, no one can tell where it will end. And the remedy is as various as the cause. The cause can only be ascertained by careful observation by the farmer on his own farm. But uniformly good food,—proper food,—quiet, good judgment, and proper care and warmth, will generally carry a herd of cattle over most of these difficulties.

Mr. Root, of Barre. I desire to invite Mr. Ellsworth to state his method of preparing his butter for market. Dr. Loring, in his very sensible remarks, has alluded very pointedly to the deleterious effects upon butter caused by its transportation to market. I desire to invite Mr. Ellsworth to state his method of transporting butter from his home to market, which I believe is the most practicable and sensible method I have ever seen adopted.

Mr. Ellsworth. I have seen very much said in agricultural papers about butter and cream being taken into bad places. I have heard it said that cream, before it was taken off was more sensitive than butter, but I hardly think that is so. I will give my experience on that.

This was my first season of making butter. I have as good a butter room as I could arrange, but I found, after the weather became somewhat hot, that the sun struck upon one side of the building so that the boards were quite warm. I cut a large quantity of black and white birches, and placed them against two sides of my butter room, to prevent the sun from striking it. I have windows on all sides, and those were let down. This, you will remember, was in extremely hot weather; so much so, that I kept the windows open night and day, except in the middle of the day, when they were shut. It worked admirably, and I was very well pleased for a few days. But after the birches became wilted, one foggy, damp morning, as I passed into the butter room, I noticed that I smelt the birches very plainly. I thought the cream might partake of that flavor. I skimmed and tasted some of the cream, and true enough, the birch was there, and in the cream that adhered to the pan, I could taste it as plainly as you could if you chewed the twigs. I thought I was stuck, sure. I was making some 120 or 130 pounds a week at that time. We churned the butter as usual, and to my surprise, the buttermilk had that flavor, but I could not detect it in the butter. The butter came to Boston to Mr. Hovey, and I got my usual price. There was not a word said about anything wrong in that lot. That satisfied me that cream is not so sensitive as butter. I thought that was very good proof that the butter globules did not receive that odor, so that when they broke, the buttermilk took the flavor.

Now, in regard to transporting butter. My whole aim is to keep it from the air. I do not want any kind of air to reach it. If it is pure air, it will abstract the sweet flavor; if it is bad air, it will do harm, of course. I cover it from the air from the time it is salted until it is worked. Then it is boxed as soon as it can be, and covered. I have three different sizes of boxes. My shipping-box is something like an old-fashioned tool-chest, and holds four boxes of thirty pounds each. The shipping-box is two boxes high and two boxes wide. They are the common round butter boxes, but the shipping-box is a square box, with handles at each end. A rod comes up at each end, and there is a thumb-screw outside on the cover. Listing, such as comes on the sides of cloth, is tacked around the edge of the box. When the cover is screwed down, the box is pretty tight. You will

see that there is a vacant space between the two boxes, something like a three square. I had two galvanized iron boxes made, three square, or nearly so, that just fit into that cavity, and these are filled with broken ice, about the size of a hen's egg. These boxes are filled with ice, the butter put in, and the cover screwed down tight, about six o'clock in the morning, in hot weather. I meet the express train at West Brookfield at twenty minutes before eight, and my butter gets to the stall of Mr. Hovey at half-past eleven. Mr. Hovey says that two-thirds of the ice is in the boxes, and the butter, I have been told, is apparently as hard as when it started. I think if there had been a cross road direct to Salem, the Doctor could have got a little taste of my butter just as good as at home.

Dr. LORING. That is delivered where?

Mr. ELLSWORTH. To Mr. Hovey, in Faneuil Hall market.

Dr. LORING. Suppose the consumer lives at the South End?

Mr. ELLSWORTH. I am not responsible for it after it gets into a middleman's hands.

Dr. LORING. There is where the difficulty comes in.

Mr. ELLSWORTH. The butter in that way comes into market perfectly sweet and fresh as it starts from home. I think any one can send butter in that way.

Mr. GOODMAN, of Lenox. This subject, it seems to me, is a very important one. I merely want to sum up a few ideas on the subject. I think my friend Dr. Loring states it rather too strongly when he says that all the bad qualities of the Jersey butter that comes to this market are owing to its having been transported. I have no doubt that butter is somewhat injured by transportation, and perhaps Jersey butter a little more than other kinds, through its richness, but I do not believe that is the main difficulty with Jersey butter or any butter. The great difficulty, it appears to me, is in butter making, and if this essay of Mr. Ellsworth could be distributed all through the country, among the farmers, we should get a great deal better butter than we do now. It is just as it is with bread-making. You cannot go into any family, even in New England, and find throughout the year uniformly good bread; and if you go West or South, you find it very bad. It is not because they have not good materials, but because there is no uniform system of making it. In Europe it is reduced to a system, so that it is always good.

You never find in Germany or France any such thing as poor bread. The reason is, that the thing is managed systematically. They understand of what materials it should be made, how it should be made, and when it should be made; and they know if it is not good, it is quite a loss to their pockets. The difficulty with our butter is, that it is made upon various systems, and until we get some method of making it as we do cheese, I do not believe that we shall have uniformly good butter; but, at the same time, by the distribution of such information as is contained in the essay, we shall have a great deal better butter.

We have in our region two prominent kinds of butter. We have good butter, and then we have what is called "Irish butter." It is called "Irish butter," because it is made, to a large extent, by those people,—very clever men, some of them are,—who are coming in and usurping the New England farms. They do not make the good butter that our American women used to make. That is brought to market and becomes "store butter," because the store-keepers mix up the various kinds of butter they receive in one tub, and so it is sold. That is miserable butter. While we are getting fifty or sixty cents for good butter, this ordinary butter cannot be sold for over fifteen or twenty cents.

Now, as to Jersey butter. It seems to me we ought not to be frightened by the idea conveyed by Mr. Hyde. I apprehend that it is well settled that for butter-making, there is no class of animals equal to Jersey cows. There is no class of animals that produce like from like as regularly as do the Jerseys, consistent butter-makers. I admit that there is no better class of animals in the world than the old native stock of New England. I have had in my dairy as good native animals in every respect, as any thoroughbred; but the difficulty is, that when you get a cow of that kind, she may have a dozen calves, and there will not be one that will be like the dam. Now, if you have a Jersey cow that is a good butter-maker, and you have a bull to match her, you are certain that her progeny will be like her. Why is it, if the Jerseys are not the best butter-makers, that their butter is commanding the highest price in our market? There may be bad butter from Jersey cows sent to this market; —bad, not because it is Jersey butter, but because it is badly made or badly transported. But is there any butter but Jersey butter

that is sent to New York, and sold for $1.25 a pound; or sent from Berkshire County to Boston hotels and sold for 75 cents? Three-quarters at least of the butter that is sold in this city, in New York and Philadelphia, for from 75 cents to $1.25 a pound, is Jersey butter, and I do not know that there is any other. That butter brings that price because it is well made. The gentleman who sends it from my region and gets 75 cents a pound has one of the best butter-making women I ever knew. His establishment is complete in every respect. His cows are regularly fed, and most important of all, they are well cared for, curried and cleaned, and their stable is in such a condition that those peculiar aromatic flavors which disgust gentlemen when found in butter, and which generally come from stables, are not intermixed with his butter.

I say, therefore, having tried the various breeds, having read about them and examined them, I do not believe that we shall find any better butter-makers than Jersey cows. But, sir, my main point in this matter is this: that what we want throughout the State is a more general dissemination of information as to how butter should be made, how cows should be fed, and particularly how they should be taken care of and cleaned. The gentlemen who come here know how their stables are kept. The most intelligent farmers generally come to this Board, and they almost all, after having been here, come to believe that the cows all through the country from which butter is made, are nicely and cleverly taken care of. But when you go through our rural districts, you will find that that is not the case; that in the majority of cases, the cows are so bedded, there is so much manure around them, so little attention is paid to cleaning them, when they are milked, that you cannot wonder the butter is poor. When you get the information of which I have spoken disseminated, and get a more uniform system of butter-making established, you will see a marked improvement in butter-making.

Mr. ALLIS, of Conway. I am acquainted with one fact which goes somewhat to show that the name or stamp upon butter, frequently goes a great way in the market. A gentleman from Berkshire County, by the name of White, some years ago, moved into York State, near Orange County, and kept a large dairy. He sent his butter to the Chicago market, to a gentleman who happened to be dealing in that article there,

with whom he was well acquainted. He lived so near Orange County that he thought he could venture to stamp it Orange County butter, and it sold at a very high price. He ran that farm some two or three years, and then went West. He thought he would get nearer his market, and moved into the vicinity of Chicago. Living so near he had not the face to mark his butter "Orange County," so he sent it to the same market in Mr. White's name. They said they did not want any of that mark; they did not want anything but Orange butter; they couldn't sell it. Seeing what the trouble was, he ventured to stamp his butter "Orange County," and he never had any difficulty after that in selling his butter.

On motion of Mr. DAVIS, of Plymouth, the subject was laid on the table.

Mr. DAVIS then moved that the matter of fixing the time for holding the shows of the Plymouth County, the Bristol Central and the Marshfield Societies be referred to a committee of three. Carried.

On motion of Mr. STOCKBRIDGE, it was voted that the same committee fix the time for holding the Deerfield Valley show.

The Chair appointed the following gentlemen as the committee: Messrs. Stockbridge, Hubbard and Phinney.

The report was then taken from the table and adopted, when the Board adjourned.

FOURTH DAY.

The Board met at 10 o'clock, A. M., Mr. PECK in the chair.

Present: Messrs. Allis, Boise, Brown, Bucklin, Clark, Converse, Davis, Fay, Fearing, Goodman, Hadwen, Hubbard, Hyde, Knowlton, Ladd, Leavitt, Loring, McElwain, Moore, Phinney, Root, Saltonstall, Slade, Stone, Stockbridge, Sturtevant and Wilder.

Mr. GOODMAN, on behalf of the Committee on the Assignment of Delegates, submitted the following:—

Essex,	S. B. PHINNEY.
Middlesex,	J. F. C. HYDE.
Middlesex North,	E. T. MILES.
Middlesex South,	RICHARD GOODMAN.
Worcester,	GEORGE M. BAKER.

Worcester West,	H. Converse.
Worcester North,	J. Ladd.
Worcester North-West,	E. W. Boise.
Worcester South,	N. P. Brown.
Worcester South-East,	R. H. Leavitt.
Hampshire, Franklin and Hampden,	L. Saltonstall.
Hampshire,	Jos. N. Sturtevant.
Highland,	T. L. Allis.
Hampden,	Levi Stockbridge.
Hampden East,	T. P. Root.
Union,	F. F. Fay.
Franklin,	J. McElwain.
Deerfield Valley,	W. Knowlton.
Berkshire,	E. Stone.
Housatonic,	A. P. Peck.
Hoosac Valley,	N. S. Hubbard.
Norfolk,	A. Fearing.
Bristol,	M. P. Wilder.
Bristol Central,	C. G. Davis.
Plymouth,	A. P. Slade.
Marshfield,	O. B. Hadwen.
Hingham,	G. B. Loring.
Barnstable,	A. M. Myrick.
Nantucket,	W. S. Clark.
Martha's Vineyard,	W. Birnie.

The report was adopted and the assignment made accordingly. Mr. Goodman then submitted the following report on the

AGRICULTURAL AND HORTICULTURAL EDUCATION FOR WOMEN.

Mrs. Cheney, in her address at the meeting of the Board at Fall River, has treated the subject of the horticultural education of women with such fulness and appositeness, that it may seem a work of supererogation, at least, for one of the masculine gender to attempt to glean the field over which she has traveled; but, perchance, as the topic at the head of this essay has been assigned to your Committee, it may not be presumptuous to attempt to enforce the views presented by Mrs. Cheney with a few considerations from a different stand-point.

M. De Tocqueville, the acutest observer of our institutions among the mass who have ventured to record their criticism on the democrats and democracy of America, compliments us by saying that our singular prosperity and growing strength is owing

mainly to the superiority of our women. It is worth while to consider for a moment in what that superiority consists, as germain to the subsequent inquiry whether it will be lessened by an education in provinces commonly considered to belong exclusively to man. This superiority may be sexual, or as contrasted with the condition and qualities of females of other countries, and it is the latter phase to which the political philosopher undoubtedly alludes. The *right* of woman to labor is common to the old and new continents, but women have not been, as a class, *doomed* to labor of a degrading or unsexual nature, under the free institutions of the United States, and no traveler from hence can record in his note-book, as Senator Wilson did in his, during his tour abroad last summer, of Ayr, in Scotland, that he saw seventeen women hoeing in a field, and a man, without a hoe, overseeing them!

No women are seen here, as in Germany, working with barrows on railroads, carrying coal, or mortar in a hod up a ladder to the tops of six-story buildings, nor, *horribilé dictu!* yoked with dogs, bulls and cows; nor is the hermaphrodite class, called by Count Gasparin "female men," yet common among us, though a few specimens occasionally crop out just to deter us from desiring or fostering their increase. In Europe, generally, the right of woman to labor is not only conceded, but the right of man to live in idleness upon the fruits of such labor is acquiesced in, and as shop-keeper, stall-tender, street-cleaner in France, outdoor laborer at all employments in Germany, Switzerland, South of Europe, and even in England, and also there as hotel-keeper, boarding-house and lodging-room tender, woman assumes the occupations of the other sex, and is substantially the head and support of the family, performing that daily toil for bread, which is man's inheritance, and which he cannot without infamy impose upon his helpmeet, thus compelling her to bear a double curse for the original sin of both.

We have not as yet confounded together the different characteristics of the sexes, making man and woman into beings not only equal but alike; much less have we turned women into inferior beings, fit only as companions for those whom she, equally with man, was created to rule over, but conceding her equality in the highest sense, we have admitted the wide differences between her physical and moral constitution and that of man, and

so apportioned the labors of life, that, whilst the outward affairs, the rough and hard work should fall upon the man, the domestic employments are peculiarly the province of the woman, and sufficiently engrossing to preclude her from a desire to travel beyond their limits; and consequently our females present that delicacy of manners and appearance, and strangers would not find it difficult, as among the Esquimaux, to distinguish the woman from the man. Of course exceptions occasionally form the rule, and we discern, yoked together, specimens of humanity showing sexual differences by the garb; but the grey mare is the better horse, and the domestic carriage, with its entire load, is carried along by the more spirited animal.

"The fact is," said one of these superior beings, "a man does not know how to straighten up things. He does not know where to commence. I don't wonder that when God made Adam, he went right to work and made a woman to tell him what to do!"

Physiology demonstrates that woman is not so constituted as to compete with man in physical labor, and the history of woman in all ages forces us to the conclusion that the qualities of her mind are different from that of man, leading her to reason intuitively, instead of plodding through logical arguments; consequently she is rarely a constructor or inventor, but her faculties are especially adapted to arranging and beautifying what is constructed, in assisting man in his improvements, but preserving in all she does her sexual significance, and her equality and independence, as neither sex can dispense with the other.

Will the education of women in agriculture and horticulture in any way interfere with this divine adjustment of the sexes? I trow not, for various reasons; the chief of which is, that the mere education in the theory of any employment, or even such practical application as may elucidate the theories, does not imply that the hard work, or actual labor, is to be performed by the neophyte. The vast businesses of our country are directed in the closet or the counting-room, and many of our successful agriculturists carry on a thriving employment without putting hand to plough, or any where except in the pocket; and the luxury of farming is not considered inconsistent with the

refinement or white-kiddedness of the most delicate of the male sex.

Warriors like Xenophon, philosophers like Cicero, statesmen like Burke, Washington and Jefferson, and poets like Horace, have combined the pursuits of agriculture with more engrossing cares, and if all could but describe themselves, as did the latter, *Satis beatus unicis Sabinis*,—

> Completely blest
> With a happy little Sabine nest,—

they reaped from the employment a wholesome recreation, and endorsed the worth of a business on which, more than any other, the fortunes of a country, moral, political or national, essentially depend.

Mrs. Adams, the wife of John Adams, whilst he was absent from his country as a joint commissioner to France, remained at home, and managed, as she had done during his necessary absences at the seat of government, the affairs of the household and the farm.

Rev. Henry Coleman, in his narrative of his agricultural tour in England, gives a fascinating account of a visit to a large estate, where the lady of the manor was the presiding genius, and herself conducted him through the cattle yards and pens, and showed an entire familiarity with the breeds and characteristics of the occupants; and Lady Pigot is known at the present time as one of the best breeders of Shorthorn cattle in England, rivaling in the prices she gives and obtains for her cattle the munificence of her British and American male competitors.

The best farm in England is reported as kept by a woman, and as having taken the first prize recently offered by the Royal Agricultural Society. It is a farm of 400 acres, devoted to pasture, grain and stock. Only four horses are kept, yet such was the admirable system of management, they were sufficient for the cultivation necessary for 70 acres of wheat, the same of barley and turnips, besides some oats and beans. The produce sold was, 30 three year-old steers, and 200 fat sheep, all raised on the farm; 2,450 bushels of wheat, and 3,290 bushels of barley, which realized $15,895, besides other produce, as pork, wool, tter, cheese, etc. Early in July the turnips nearly covered

the ground, and on 72 acres of them the examiners saw *no weeds;* in fact, the whole farm was perfectly free from them. Twenty tons of guano, bonedust, etc., were used each year.

These instances are sufficient to show that even agricultural pursuits may be prosecuted successfully without manual labor on the part of the owner, and without in any way detracting from the social position, or infringing upon the delicacy of either sex.

The history of nearly every patriotic State in the Union abounds in incidents of young women during the rebellion usurping *ex necessitate* the rights and privileges of the fathers, husbands or brothers who were at the front, and not only directing the operations of the farm, but carrying on the various processes in person, riding the machines, loading and unloading hay, hoeing and reaping; and the cases are not rare at the West of females now managing and cultivating farms as a pursuit more agreeable to them than indoor employments; and taking into consideration the machinery by which farming is now carried on, the comparatively slight amount of severe manual labor requisite, and which can be hired for the emergencies, these women farmers may find it a more satisfactory business than many trades followed by women, and the labor on the whole less severe.

"There appears," says Sir Humphrey Davy, "nothing more accidental than the sex of an infant. Yet take any great city of any province and you will find that the relation of males and females is unalterable." This dictum of the philosopher is substantially correct, and it is apparent that an unerring intelligence so adjusts the balance of the sexes, that were it not for the wars and emigrations of man a helpmeet would be found for each of the male sex as for his great progenitor, and the sacred institution of the family would thus enfold the whole human race; and this being the normal condition, it is proper before deciding as to the effect of any class of education upon those abnormally situated to examine its appropriateness to the majority. It is conceded that the great need of women at the present time is a more substantial and domestic education. Personal adornment a century ago was the foible of both sexes, but the men have sacrificed mere show to substance and comfort, whilst the women, if any change has taken place, have rather increased their fondness for rich habiliments. Somewhat parallel to this

has been the education of males and females, the former striving for more practical knowledge, and the latter yet preferring the ornamental to the useful; and whilst our colleges for boys have added to the old curriculum many studies more directly bearing upon the arts of life, the schools for girls have continued showy and pretentious, and the best education our daughters obtain is that at home, where their moral and social nature receives the highest graces of vigor and refinement, and they are taught the domestic accomplishments appertaining to the due economy of the household. Primarily, the education of the man is, or should be, to prepare him to attain property, position and influence; that of the woman should be to prepare her to second his efforts by her understanding and advice and assistance, so far as it is within the scope of her ability, and does not trench upon her own peculiar duty, and also to prepare her for those duties. "To prepare us for complete living is the function which education has to discharge; and the only rational mode of judging of an educational course is to judge in what degree it discharges such function." Assuming, therefore, as we should, that every boy will become a husband and parent, and every girl a wife and mother, why should there be a parting of the ways when each leaves school, and why should the intellect of the male continue to be fostered and strengthened, whilst that of the female is neglected and her further education substantially abandoned? It is no answer to say that her endowments and adaptations are not the same intellectually as those of the male, because the same may be said of the bodily functions; and yet both sexes partake of the same sort of food, and our natures, which assimilate such provision according to the requirements of the system, will do the same with the mental pabulum. Even the advocates of the origin or improvement of species by artificial methods do not carry their theories so far as to assert that any changes can be permanently made in the distinctive attributes of the sex; that among the feathered songsters of the grove the music shall issue from the throat of the female instead of the male; that the brilliant plumage shall, as among bipeds of the human race, be the peculiarity of the feminine gender, or that any style of feeding or natural selection can give vocal charms to the dumb wives of the grasshoppers. Neither will education alter the natures of man or woman as

the complement of each other; but he will retain his stirring, practical, inventive and mechanical faculties, and she her intuitive affinities for the true, the beautiful, and the good; and the great benefit of an equal education will be to them, that the wife can more understandingly employ her divine faculty of counsel, her all-pervading influence; and the husband when discouraged by ill success, or unable from his own suggestions to solve the difficulties of the problem of life, may, from her more spiritual perception, receive suggestions which shall enable him to see his way clear. But the great glory of the woman as a thing distinct from that of the man, is her maternity; her great privilege of nourishing and educating the human race; for the early education which the child gets at home is the planting of the seed which springs up under all circumstances, and though crowded out for a time by other vegetation, will through life show itself like those bushes and trees which start up after the denuding of forest lands by the axe or fire; sometimes mere brambles and worthless brush, more often of great lasting value. What more lamentable sight than that of a young mother unfolding a human character committed to her charge, whilst she herself is profoundly ignorant of the phenomena with which she has to deal, knowing nothing of her own, much less of the child's functions, ignorant of the effects that will be produced by this or that treatment, and proceeding with the management of this wonderful specimen of God's handiwork in much the same manner as a quack doctor with his patient, trying all things and in many cases finding the surest remedy for all ills in the churchyard mould?

It was a witty and handsome jeer which Aristippus bestowed on a sottish father, by whom being asked what he would take to teach his child, he answered, A thousand drachmas; whereupon the other crying out, O Hercules! how much out of the way do you ask! for I can buy a slave at that rate. Do, then, said the philosopher, and thou shalt instead of one, purchase two slaves for thy money; him that thou buyest for one and thy son for another. Somewhat after this manner is the husband sold who obtains for the mother of his children a wife without education, and intrusts to her care and almost exclusive attention, their destinies during adolescence, and does it not follow that if a good mental and moral training is necessary for the male adult in

after-life it is equally necessary for the female adjunct? and if the last stage in the mental development of each man and woman is to be reached only through the proper discharge of the parental duties, there should be equal preparation for the performance of such obligations.

But, after all, these arguments might have been considered necessary in the eighteenth century when, if the incisive pen of Lady Mary Wortley Montague indites the truth, men debarred her sex from the advantages of learning, fancying that the improvement of their understandings would only furnish them with the more art to deceive the male sex, and because the males flattered themselves that the females were really of inferior rank; and the Lady Mary was persuaded that if there was a commonwealth of rational horses (as Dean Swift has supposed), it would be an established maxim with them, following the cue of their masters, that a mare could *not* be taught to pace! In the nineteenth century we have progressed far beyond this, and whatever differences of opinion there may be as to woman's right to vote, and the propriety of her taking part in public affairs, the majority of intelligent male citizens are agreed in opinion that women are by natural right entitled to all the advantages of education enjoyed by men, and that whatever difference there may be in the faculty of production, in the faculty of acquiring knowledge there is no difference between the feminine and the masculine mind.

"On the cultivation of the minds of women depends the wisdom of men," said Sheridan. "The future destiny of the child is always the work of the mother," said Napoleon. And even for her own sake, woman is as much entitled to an education as her brother, for no entertainment is so cheap as reading and study, no pleasure so lasting, nothing so moderates the passions, nor teaches one to be contented at so small an expense as knowledge; and though the ultimate end of the education of a woman is to make her a good wife and mother, it will have the effect of rendering a virgin state happy, and as in the one case it will not interfere with the indispensable requisite of every American wife and mother to know how to order and regulate the family, how to govern the domestics and train up her children, but rather insure a more wise judgment in those prerogatives, so in the other case, a proficiency in letters will not detract from the

mildness, humility or modesty of the maiden, but add to her pleasure, contentment and usefuluess.

Applying these self-evident truths to the subjects of this essay, and realizing that the study of agriculture comprehends a knowledge to be acquired of all the sciences, that there is scarcely a branch of science it is not necessary a man should possess to be a successful farmer, we can see every reason why the women who are to be the farmers' helpmeets should pursue the same studies that he does, and thus retain through life their intellectual equality, and be the better able to coöperate with the husbands in scientific agriculture, by judicious and understanding advice and suggestion, and implant in the young minds of the coming generations that love for a study of their calling which will develop it among the foremost sciences, and carry it forward to a point of progress and pecuniary success undreamt of by their fathers. Even those persons of experience in training youth, who have laid out a curriculum of studies to be pursued in the education of women, embrace within it nearly all those pursued at the Agricultural College of this State, claiming that for them "the female mind possessess peculiar aptitude, as the faculty of observation is more readily developed in women than in men, and they possess in a greater degree the genius of manipulation."*

"My dear, will you play your thousand dollar polka?" said a farmer to his charming daughter, six months after her return from a fashionable boarding-school. The young lady's musical performances had dwindled piece by piece to a solitary polka, and the fond parent's sole compensation for his many years' outlay was the precious "thousand dollar polka." The same amount of time and money expended on the education of a farmer's daughter at an agricultural college, would produce more permanent results, and fond parents would not have to grieve, as the custom now is, over the misappropriation of their hard earnings.

If the United States is the land of modern chivalry where the moral qualities of woman are most highly valued, and her station in society fully acknowledged, and if, as M. de Tocqueville asserts, our advancement in prosperity and civilization is owing largely

* Dr. Hedge in a late address on the Education of Women.

to the superior character of the female sex, we can only retain this high eminence by constantly enlarging their intellectual sphere contemporaneously with that of the other sex.

And whilst we have no fear that there will be any such reversion to barbarism as the compulsion of American women in any class to perform the rough labor of the fields, there is a well-grounded distrust that unless the future mothers of our agriculturists take a higher view of the calling of their husbands and sons, the latter may not pursue it with the ambition and knowledge requisite to its complete success. But if they are instructed in the arts of agriculture and its kindred sciences, we may hope to see our farmers' wives coöperating with their husbands in the management of the farm, and instructing their sons in the elements of that scientific knowledge which will give such a different hue to their employment; whilst to themselves untold benefits will accrue from the substitution of useful knowledge and subjects of mental investigation for the idleness, sauntering gossip, frivolous reading and other modern female dissipations; and even the coarse and common things—the meat, drink and household cares—will be elevated by the different spirit in which they are ministered by the educated woman.

R. GOODMAN,
For the Committee.

The Report was accepted.

Mr. STONE, from the committee appointed to consider the report upon the time and place of holding the country meeting of the Board, reported in favor of holding it at Barre on the 12th, 13th, and 14th of November.

Mr. STOCKBRIDGE objected to this time as it would bring the meeting in term time at the Massachusetts Agricultural College.

Mr. CLARK then advocated holding the meeting on the 3d, 4th, and 5th days of December. This amendment having been carried the report as amended was adopted.

Voted, That Hon. Marshall P. Wilder and the Secretary be appointed delegates from the State Board to the Convention called by the Commissioner of Agriculture, to be held at Washington on the 15th inst.

Mr. GOODMAN then submitted the Report of the Committee appointed to consider and suggest a list of subjects for investigation and essays, as follows:—

Field and Garden Seeds —Messrs. Moore, Hyde and Wilder.

Cultivation and use of Forest Trees.—Messrs. Clark, Stone and Durfee.

The use of Steam on the Farm.—Messrs. Stockbridge, Hadwen and Fay.

The relative value of Farming among the occupations of Life. —Messrs. Hubbard, Slade and Sturtevant.

The importance of providing other Food for Cattle than Pasturage.—Messrs Goodman, McElwain and Root.

This Report was adopted.

Voted, To appoint a Committee to make arrangements for the meeting at Barre.

Messrs. Root, Hadwen, Hubbard, Fay and the Secretary.

Mr. STOCKBRIDGE then presented the following paper upon the

AGRICULTURE OF EASTERN HAMPSHIRE.

Although the Hampshire County Agricultural Society is not limited by statute to any particular territory, and has efficient members, receives contributions, and dispenses premiums without regard to county lines, the real field of its operations is in Eastern Hampshire, and comprises the ten towns of Hadley, South Hadley, Amherst, Granby, Pelham, Belchertown, Enfield, Prescott, Ware and Greenwich. The country is drained by the Connecticut River and its tributaries, and has a slope to the west and south-west. Its elevation above tide-water is from six to seven hundred feet. Much of the surface is broken and hilly, and it has mountain ranges running north and south. The general mountain line is intersected by the Holyoke range, running east and west, some of whose most prominent points are between eleven and twelve hundred feet in height. It embraces an area of 113,893 square acres, and contains a population of 19,447, who are almost exclusively engaged in agriculture. It has but two manufacturing villages of any size or note,—South

Hadley Falls and Ware Village. The geological formation of the region is principally gneiss, but sandstone and trap exist to a limited extent. The general character of the soil is drift composed of the abraded materials of the granite, slate and limestone rocks of Franklin County and Vermont. This debris has been sorted by water currents and specific gravity, so that we have distinctive soils, of clay, sand and gravel, and soils of varying characteristics of which some one of these substances is the predominating base. Along the streams, but especially bordering the Connecticut in Hadley and South Hadley, are more recent deposits of alluvial soil which form extensive meadows of great and enduring fertility.

The aborigines had settlements on the streams, their hunting grounds were the adjacent hills, but they cultivated the river bottom quite extensively with corn, and so important did they consider this cultivation, that when they deeded it to the settlers, sixteen acres were set apart and described by metes and bounds, which they were to have to grow corn upon four years, during which time they were to prepare other corn lands farther up the river. The first settlement of whites was made here in the year 1658. The land was honestly purchased of the Indians, honestly paid for, and was conveyed by deed in due form, and recorded. The settlement was at the place now known as West Street in Hadley, but the township embraced nearly all the territory now included in the towns of Hadley, Hatfield, Amherst, South Hadley, Granby, Pelham and Belchertown. The outlying lands of the purchase were taken up and settled upon soon after, but the Indian war stopped all expansion and drove the settlers into the stockade or to the adjoining lands, to remain until peace was secured by the practical extermination of the Indians. Within fifty years of the first settlement at Hadley, nearly the whole territory of the ten towns was occupied by settlers. All that portion of the country lying east and south of what is now the town of Amherst, was originally covered with a dense forest, principally of hard wood, though the various varieties of pine were not uncommon. West of the line spoken of, to Connecticut River, there was very little forest, though much of it became wooded within a hundred years from the first settlement. The settlers were exclusively farmers and at once commenced agricultural operations, so that our lands have to a

greater or less extent been under cultivation for a period of about one hundred and seventy years This cultivation at first was very rude, and in consequence of the circumstances of the people, was a struggle to wring subsistence from the soil without any regard to the preservation of its fertility. Necessity at first compelled to this course, but although the pecuniary condition of the farmers was soon much improved, but little change was made in their system of cultivation for a hundred years. Their staple products were wheat, rye, corn and cattle. In the wooded portion of the country the dense forests were felled, and most of them burned on the land, after which, with very poor cultivation, it for several years annually produced crops of grain of from thirty to forty bushels per acre. A large proportion of these lands, which from their rocky or precipitous character it was difficult to cultivate, were then devoted to the growing of stock and the feeding of milch cows. Other lands which could be readily ploughed, were, from father to son for generations, kept under triennial rotation with cattle or sheep, and grain, two years in pasture, and one in grain, blindly trusting in Providence, and their sheep, to keep up the land while they sent all its products away. After the settlers had become secure in their possessions, and prosperous, large quantities of their grain products were transported down the river to Hartford and across the country to Boston and thence to a foreign market. They always sent to market large numbers of cattle, and eventually dairy products, but during the first fifty years of the present century kept most of their grain at home, using it to stall-feed cattle. At different times their system of cultivation has been varied by the introduction of other crops. Flax was cultivated early and for a long time, and hemp and teazles have been grown to some extent. About the commencement of the present century began the cultivation of broom corn, both as a money crop to be sold and to produce stock feed. Its cultivation was profitable, and as its seed and stalks were left, it was not exhausting to the land. With the exception of hay it was the leading crop from 1830 to 1850, and was largely cultivated several years later. In 1855 the town of Hadley cultivated about a thousand acres of broom corn, but in 1865 it had decreased to less than one hundred, and at the present time its cultivation has practically ceased. The causes which led to a cessation of this busi-

ness were its extensive cultivation at the West, and the introduction of the more profitable culture of tobacco which began about 1850, and has been continually increasing to the present time. In 1855 the towns of Hadley, South Hadley, Amherst and Granby, cultivated sixty-eight acres of this plant, but in 1865 its growth had extended to all the ten towns named, and they had nine hundred and forty-three acres in tobacco. It is the universal opinion of that community that its growth has increased since that time, but the statistics of 1870 give us but nine hundred and twenty acres devoted to its cultivation.

In selecting farm lands in this section, the original settlers took first the highlands which were heavily wooded and had a dry soil, and then dry alluvial and the lighter class of sandy loams. The former after yielding a few crops of the smaller grains by indifferent cultivation, were devoted almost exclusively to grazing, and the latter from father to son were kept under cultivation to grain with partial rest from time to time by the growth of grass. For more than a hundred years these were the only kinds of soil used, and generally without any systematic rotation of crops, or any effective plan for preserving its fertility. When it materially deteriorated new resources were supplied by clearing and using forest lands, but only in modern times has there been any attempt to bring to the wants of husbandry the low, wet lands where are accumulated choice elements of fertility gathered from the adjacent country. The general system of cultivation pursued has gradually deteriorated the producing power of the soil. Some whole farms, and a very few acres on many farms having received special attention still yield crops as of yore, but as a rule Indian corn decreased from sixty to twenty-seven bushels per acre; rye from thirty-five to nine; wheat, which produced from thirty to forty bushels, is not grown except as a rare and pet crop. Hay fell from two to one ton per acre, and pasture which once carried a cow to two acres, required five acres to the cow, or it ceased to produce grass at all. Although a portion of this territory, which at its first settlement was cleared land and was afterwards permitted to produce forest, yet as a general rule the forest lands have been simply devastated. For more than a century the wood had little or no value, and it was swept away to make farms, or to get new rich land when the old failed, but in modern times the process

has been hastened by the great value of forest products. Until within the last twenty years, this forest clearing was followed by fire, the drag and grain to enhance the profits. During the last two decades land owners have been more provident, and to considerable extent, forest clearings have not been burned, and the land has been allowed again to produce wood, though without special care or culture. Much land also, in rocky, precipitous, exposed localities, which had been burned for grain after taking off the forest, from necessity, has been devoted to growing wood, so that our woodlands are now increasing, and there is a hopeful prospect that ere long our hills and mountains will be covered with forest. In 1865 these towns had 17,974 acres of woodland; in 1870 they had 21,536 acres. But though there has been a good increase of the number of acres there has been none in the cords of standing wood, and another decade of the present practice will be needed to produce that result. The value of our forest products now annually sent to market is about $100,000. Although much of the area of these towns has special adaptations for the production of the cereals, yet stock husbandry, the production of beef and dairy products, has always been an important pursuit. The records do not state the fact, but there is the best reason for believing that the first emigrants to our oldest town (Hadley) brought neat stock, sheep and swine with them. The compact which was drawn up and signed just before they emigrated, by the "proprietors" who purchased the land, stipulated that each proprietor besides his "house lot," should have the right to put cattle in the "cow pasture." And very soon after the settlement, in adjusting their relations with the Indians, it was agreed on their part, that the Indians should have the right to hunt and fish on their unoccupied lands, and the Indians agreed that they "would not let down the fences of the inhabitants, or let the cattle and swine upon their fields, nor hunt or kill any cattle, sheep or swine with their dogs." As the settlers were from Connecticut, where they had traded much with the Dutch at Manhattan Island, and with the colonists in Delaware and Virginia, it is more than probable, that our first cattle were of Dutch and English origin, though the large number of yellow and brindle cattle in their progeny indicates that they after a time became mixed with the Danish importations to New Hampshire. During the latter part of the

last century some of the towns were noted for their extensive dairies, and up to the present time others are famous for the quality and number of their stall-fed cattle. Until within the last thirty years no systematic efforts were made for the better breeding or improvement of the neat stock. About that time Paoli Lathrop, Esq., of South Hadley, introduced the Shorthorns, and by skill and attention to the business he was so successful as to become known throughout the country as one of its best breeders. Others followed his lead and the blood of the breed was quite widely disseminated, producing so marked a change in the quality of our cattle, that in some sections a beeve at three years was as heavy as under the old order of things at four. Our agricultural society has endeavored to encourage the work of improvement, by offering large premiums for thoroughbred stock, and by introducing bulls and granting their use to the farmers. At the present time we have pure-bred animals of the Shorthorn, Ayrshire, Jersey and Devon breeds, and an infusion of their blood in our grades. It is doubtful whether we have so many cattle on our territory now as we had seventy-five years ago. Our farmers, to a great extent, have ceased to grow cattle for beef or work, and give their attention to dairy animals, but they are decreasing in number. The earliest statistics to which I have had access, show that excluding swine, the ten towns had in 1855, 17,399 domestic animals; in 1865, 18,731; and in 1870, 15,640. The number of horses in 1855, were 2,408; in 1865, 2,782; in 1870, 2,012. The working oxen in 1855 were 1,883; in 1865, 1,197; in 1870, 1,097. These figures show that while horses have decreased 396 in fifteen years, working oxen have decreased 786. Horses have been substituted for oxen as the working teams of our farms to a much greater extent than the figures would indicate. Formerly horses were kept for driving and breeding purposes; now but little comparatively is done in breeding, many of our horses come from abroad, and four-fifths of our farm work is done with horse teams.

For thirty years there has been a gradual decrease in the number of sheep reared and kept by our farmers, though stimulated at times by the high price of wool, there is a temporary increase. They are kept more for the sale of early lambs than for wool, and many thousands bought abroad are stall-fed here, which

are not returned in any statistics. The number of sheep in 1855 was 4,400, but in 1865 they had increased to 6,944, owing undoubtedly to the great increase of wool caused by the war, but the subsequent depression of the woollen trade caused their decline in 1870 to 3,477, or 923 less than in 1855.

The amount of hay produced in 1855, was 22,764 tons, but in 1870, it was 28,501. The statement has been made that the farm lands of this section of the State have materially deteriorated in fertility from their original condition, and the statistics show the kind and amount of decrease of farm products within fifteen years. There has been a material falling off in aggregate number of all domestic animals but horses and cows, and of all products but hay, dairy products and tobacco. The showing thus far, is a general break-down in the industry of agriculture, apparently a continued depreciation of soil, decrease of crops in consequence, and impoverishment of the farmer. Yet the fact is indisputable and beyond a doubt, that the agricultural community of Eastern Hampshire were never in so good condition as to-day. They have better houses and barns, better tools and implements, possess more of life's comforts and luxuries, are less encumbered with debt, have more absolute leisure, and do not tax their physical energies with such exhaustive labor as did their fathers fifty or one hundred years ago. We make more money from our farms, enjoy the spending of more, and keep more than did they. We get greater pay for our actual labor, and a larger per cent. on our money invested in the business than did they. These facts will be proved by other equally reliable statistics.

The entire capital invested in the business of agriculture in the ten eastern towns of Hampshire at the present time, in domestic stock of all kinds, in tools, implements and vehicles, and real estate, including all farm buildings, unimproved and unimprovable land, is $6,386,277. The entire cost of labor, including board, to work this capital, in 1870, was $442,724. Grant that all the other expenses of the business are equal to the cost of labor and board (but they are much less) and the whole cost of carrying on the business was, $885,448. The income from all expenses and capital in 1870, including betterments and increase of stock, but excluding the value of the annual growth of wood, was $1,660,828. Deducting the cost of

production, $885,448, we have a profit of $775,380, which is more than twelve per cent. on the capital invested. The marked deterioration of our farms, and their diminished yield was at its lowest point from 1840 to 1855. Between these periods the rapid increase of our manufactures of all kinds, the development of our railway system, the increase of branches of business, drew large numbers of our farmers from the land to engage in other pursuits, so that the number of men engaged in farming was very materially decreased from 1845 to 1860. The stimulus given to other pursuits during these years, and the increased population deriving their support therefrom, called for larger supplies of agricultural products, and materially enhanced the price of some.

Between 1855 and 1865, our farmers found themselves in the dilemma of being called on for an increased amount of their products at enhanced prices, with an inability for the want of labor to meet the demand, and they were wise in their generation, and applied the labor they had to less acres, cultivated more thoroughly, and produced such products as the markets to which they had easy access demanded. Here our real improvement began, and the statistics show the suddenness and the success of the change.

In 1855 we had 5,259 milch cows; in 1865, 4,896; and in 1870, 4,830. In 1855 we sold 456,272 pounds of butter, and 253,969 pounds of cheese. The value of the butter and cheese sold was $116,182. At that time our farmers sold very little milk. In 1865 we sold 213,209 pounds of butter, 158,245 pounds of cheese, and 110,240 gallons of milk, the whole value being $103,709. In 1870 we sold 502,753 pounds of butter, 106,241 pounds of cheese, and 206,967 gallons of milk, the whole value being $266,709, or more than double the value of the product of 1855. In 1855 we had 25,684 acres in mowing, which produced 22,764 tons of hay, or about 1,700 pounds per acre. In 1870 we mowed 23,970 acres, which yielded 28,501 tons, or 5,737 tons more than in 1855, averaging about 2,400 pounds per acre. The proportion of "wet swale" mowing was much less in the latter than the former period. There were 5,831 acres in Indian corn in 1855, which produced 167,099 bushels, averaging about 28 bushels per acre. In 1870, 2,605 acres, which produced 100,706 bushels, or about 38 bushels per

acre. Of rye, we had in 1855, 4,668 acres, producing 42,930 bushels, or about nine bushels per acre. In 1870 we had 854 acres, producing 26,126 bushels, or about 30 bushels per acre. We cultivated 1,787 acres of potatoes in 1855, which yielded 151,326 bushels, or 84 bushels per acre. In 1870 we had 1,450 acres, producing 129,468 bushels, or 89 bushels per acre. The value of all our farm products, with the exception of slaughtered meat was in 1855, $1,059,921 ; in 1870, $1,410,253, or an excess in 1870 of $350,332.

These statistics indicate pretty clearly the course of our agriculture, its progress and present condition, and it only remains to consider whether the system is the best for our circumstances, and what should be done to make it more prosperous and remunerative. The marked features of the exhibit are, that we farm many less acres than formerly, have decreased materially in the product of all the cereals, and that the bread grains, rye and wheat especially, are insignificant in amount. In fact it is undoubtedly true that our farmers do not produce so much grain as they consume. Many of them who stall feed numbers of cattle, or have their barns full of milch cows in winter, feed them freely on grain, all of which is purchased from abroad. In consequence of existing circumstances, the special demands of the markets to which we have easiest and cheapest access, the system of cultivation to which our soil has long been subjected, and its present condition, this course commends itself to my best judgment.

To make grain and export it as a market product, is to send away the choicest mineral elements of the soil, those which are very slow to develop, and which it is difficult and costly to supply. To raise large crops of hay, and feed it in conjunction with foreign grain, and send away principally carbon, in the form of fat and butter, is certainly best for the land, and in consequence of the character of our markets, and the cost of cultivating grain the best for the pocket. The results of this course are a sufficient commendation, as they show a gradual increase per acre of our leading crops.

The change in our agriculture within fifteen years is encouraging. We have, however, not only begun to set back the tide of depreciation, but commenced to ascend the steep of improvement, our progress in which, it seems to me, might be acceler-

ated by a change in the character of the lands we use, by a greater variety in the crops we cultivate, and a more constant attention to the effect on the soil of change in plant production. As a general rule, from the first settlement to the present time, the lands which have been most sought for and prized for cultivation, have been the alluvial, the dry plains and slopes, and the hills. Wet lands, not simply swamps, but those made sterile, or producing nearly worthless plants, in consequence of want of draining, though rich in all the elements of fertility, have been almost universally rejected for cultivation. Our agricultural society continually offers premiums for reclaiming these lands, and sometimes has them to pay, yet the great mass of our farmers are indifferent to improvement in this direction. Necessity has compelled to the abandonment of some of the former class of lands, but now, as a wise and intelligent system of management, thousands of acres of this area should be planted or allowed to go to forest, and judiciously cared for as such. It would be a profitable operation in itself, and have a beneficial influence on the lands in cultivation. This loss of land for any of the objects of agriculture, would be more than compensated by systematic, intelligent labor, directed to bringing our wet, water-poisoned lands into a condition for the production of all crops by draining. In some localities it would be better for a farmer to emigrate, and buy dry land for his tillage rather than to drain, but our circumstances are such that we can afford to drain ; in fact, we cannot afford to do otherwise.

The average value of all our farm lands in 1870,—the good, bad and indifferent,—was $49 per acre. But good lands for cultivation are worth from $1 to $300 per acre. We have thousands of acres now practically useless for cultivation, which if underdrained at an expense of $75 per acre, would be as good for every crop we grow as our best tillage lands. When our farmers make these changes in the lands they cultivate, it will be a long stride in the march of improvement.

That standard fruit, the apple, is cultivated by us to a fair extent, but pears and the small fruits, as market products, are almost unknown. We have good markets for such crops within easy reach, but do not supply them ; but, on the other hand, our people, farmers and all, make a market by consuming these fruits of foreign production. Our soil and climate are adapted

to such products ; their cultivation has commenced on a limited scale, and it could be enlarged to our health and profit.

The returns of 1870 do not give us credit for the cultivation of any root crops, and they do no special wrong, for our State returns of 1865 tell us that in that year of beets, turnips and carrots we had but sixty-eight acres, and pretty careful observation indicates that they have not materially increased since.

The system of carrying stock through the winter on a diet exclusively of dry hay and grain is, to say the least, one of very doubtful expediency and profit, and the introduction of roots, mangolds, Swedes, or carrots, as a crop for stock feed, would increase our crop variety, change our rotation, enable us to keep larger herds and in better condition, improve the physical condition of our soil, and increase the material for its fertilization.

In making suggestions for the improvement of the agriculture of Eastern Hampshire, we should keep continually in mind that tobacco is, and perhaps is to be, the leading crop next to hay, and on account of the ease, certainty and despatch with which it is converted into money, it is better even than that. The change, therefore, must be one which, if it lessen the cultivation of tobacco, will make a corresponding return of cash, either in ready cash, or the improvement of the lands. Now, tobacco feeds enormously from the soil, but it makes no stock feed ; it leaves nothing on the farm to compensate for the draft it makes. The fertilizing elements must be returned from other sources. In view of these facts, a desirable improvement would be the introduction of some really profitable crop, which would thrive on the soil elements which the tobacco does not consume, which would materially aid in sustaining the stock of the farm, and making manure to support its fertility.

Most careful, searching inquiry and examination at home and abroad, and through experiments tried on our own territory, at the Agricultural College, seem to indicate beyond a reasonable doubt, that the introduction of the sugar beet as a crop, and its use as stock feed, or as a fertilizer, after its saccharine matter has been manufactured into sugar, would accomplish this desirable object. This culture seems to be required by the fact that there is an enormous and rapidly increasing demand for

its products, while supplies from the usual sources are continually diminishing.

In 1871, after consuming the products of our Southern canefields, we imported and used $100,000,000 worth of sugar. That year Massachusetts used $5,000,000, and the consumption is increasing at the rate of fifteen per cent. a year. The culture can be introduced, not really as an experiment, but as a permanent business, all the difficulties of which have been solved most satisfactorily.

At the present time forty per cent. of all the sugar made in the world is from the sugar beet, and in the temperate zone. In 1871, France produced 300,000 tons of beet sugar, and the cash value of its beet products was more than $50,000,000. Those districts of the country which produced the most sugar, also produced more grain and beef than any others, and vastly more than they did before the introduction of this industry. This the farmers and manufacturers of France have accomplished under very depressing circumstances, for the government collects a tax of nearly four cents a pound on the sugar, and draws an annual revenue from the beet crop of $16,000,000.

Germany has met with equal success in this culture, and it is commencing with highly flattering propects in Russia and England.

The universal testimony is, that besides the value of its manufactured product, it is an invaluable adjunct to improvement in every other branch of agriculture.

To produce the beet successfully and of sufficient sweetness, in a measure compels to a correct system of agriculture, which results in the increased fertility of the soil and largely augmented products of all other kinds. The soil and climate at Amherst produces as sweet a beet as that of France or Germany, and sugar in every respect as perfect as any ever produced in the tropics. What the culture of the beet has done for France it may do for the Connecticut Valley, giving greater variety to our productions, making a profitable crop, and aiding to counteract the results of our present culture.

Tobacco requires large quantities of manure, rich in every element of plant-food, but especially in nitrogenous matters. The sugar beet will not bear nitrogenous food, and would follow tobacco with a very slight addition of some mineral element.

Its action on the soil will be to prepare it for subsequent crops, and after the sugar is extracted it will furnish as much stock feed as an acre of hay, and to keep more stock and make more manure.

At the present time our farmers purchase enormous quantities of fertilizers. They transport manure by rail long distances, much of it from beyond the Hudson, at an expense of from $10 to $15 per cord. Peruvian guano and the manufactured phosphates are much used, and ashes when they can be obtained. With the changes indicated in the soil to be cultivated, the increase in the variety of our crops, the adoption of a more rational rotation, and the influx of such quantities of fertilizing materials, we can have reason to believe that our agriculture will be abundantly prosperous; that although our cultivated acres may not increase, yet their aggregate products will be greatly enhanced, yielding still larger and more satisfactory profits to our cultivators.

LEVI STOCKBRIDGE.

The paper was accepted and ordered to be printed.

Dr. LORING then submitted a report as delegate to the Deerfield Valley Agricultural Society.

The various reports of the Delegates and of Committees on essays not previously acted upon, were then taken from the table, read a second time by their titles and adopted.

Voted, That any unfinished business be referred to the Committee on Printing, with full power.

The Board then adjourned.

SECOND ANNUAL REPORT ON THE INJURIOUS AND BENEFICIAL INSECTS OF MASSACHUSETTS.

BY A. S. PACKARD, JR., M. D.

The past year has been marked by the unusual abundance of two insects which have preyed on our field crops. Both are comparatively strangers in this State, and illustrate the law that new enemies of our crops make their appearance from year to year most unexpectedly, and do a large amount of damage before their presence has been generally known or often even suspected. And this probably will always continue to be the case. While the newly settled parts of the country are peculiarly exposed to the ravages of insects, after the lapse of a few years the equilibrium seems in a measure to be restored, and average crops can be raised. But still, here in New England, where the country has been settled over two hundred years, we are occasionally disturbed by the abnormal increase in the numbers of kinds of insects usually not abundant. This is primarily due to variations in our seasons, but from the scarcity of insectivorous birds which fail to come to our aid in these times of extremity, the insects remain in undiminished numbers and accomplish their work of devastation without let or hindrance. This will probably always be the case, so long as the most obvious principles of economic entomology remain unapplied.

In England, where the arable land has been cultivated for over a thousand years, Mr. Curtis, the author of "Farm Insects," complains that in economic entomology "every season brings forth fresh subjects for investigation, and although this arises in a great measure from the neglect which has attended this important department of natural history, it seems as if a cycle were revolving, which exhibits species previously unobserved, at intervals of greater or less extent; and whether regular or irregular cannot be determined for want of data; rare and unnoticed species, no doubt, become abundant or scarce by changes of temperature; certain and continued currents of air, a want of food in their accustomed localities, and similar phenomena may also change the regular course and geographical distribution of insects for a season; so that enemies to the cultivator may suddenly become great annoyances in latitudes where they had been previously unknown; and may there remain until a

counter-action takes place, either of climate or of parasitic agency, which at once sweeps away the plagues and releases us from those great armies which are employed by the Power who created them."

We may be allowed to glance for a moment at the attention paid in Europe to practical entomology. The plant louse, (*Phylloxera vitifoliæ*,) affecting the grape-vine to such a fearful extent in France, and which in this country has done considerable mischief, is still attracting much attention. Within a year past as we learn from the "Revue Scientifique," the French Academy has offered a prize of twenty thousand francs to encourage studies with the view to ascertain a remedy which shall protect the vine without destroying it, as some of the remedies proposed killed the vine as well as the noxious insects. The French Government has always been alert and liberal in this matter of economical or applied entomology, a subject more important to agriculture than is yet dreamed of in this country, where it is estimated that we lose hundreds of millions of dollars annually from the attacks of injurious insects and plants.

During the past summer the losses of wheat, corn and other crops in the Western States have been enormous. The onion crop raisers in one county (Essex) alone in this State have lost, it is estimated, at least from ten to fifteen thousand dollars' worth of perhaps the most valuable crop next to the hay crop, from the attacks of a minute insect called Thrips. This annual loss, much of which by timely exertion, and especially the cultivation of insect parasites, could be avoided, will accumulate in intensity, and become a grievous burden a century hence, when our country will be more densely populated and every grain of food will be needed; unless more attention than is now thought necessary be given to the subject.

The foresight of the French people, despite the present gloomy views of their journals over the decadence of science among them, is conspicuous in their prompt and scientific treatment of the silk-worm disease (*pebrine*). This is a disease that has already extinguished a most promising experiment in the rearing of our native silk-worm, as Mr. L. Trouvelot of East Medford, who had proved the ease with which our native silk-worm may be reared, unfortunately lost several thousand dollars' worth of them by this disease, imported accidentally in eggs of the Yama-mai moth

received from Japan *via* Paris, where they must have been inoculated with the germs of this much-dreaded insect plague.

Pasteur and Quatrefages, and others whose names are illustrious as investigators, have been commissioned by the French Government to study the causes of this disease, and it now thought, that, following out the suggestions M. Pasteur—the result of profound studies on this subject—if healthy eggs be selected by aid of the microscope, and those infested with the parasitic fungus be destroyed, silk culture will be again restored in France and Southern Europe. As the result, a single silk raiser, whose worms this year will produce 32,000 ounces of eggs, hopes next year to have 100,000 ounces, and the prospect of a profit of a million of dollars! It should be remembered that this remarkable result is due, primarily, to the most abstruse researches upon microscopic plants by specialists, for the pure love of science. Their cloister studies, put to practical account, saves the destruction of one of the largest agricultural interests in Southern Europe. In like manner had the general government or individual States, encouraged the entomologist and botanist in their studies, and caused them to be turned to practical account, we should not have had to give up the cultivation of wheat in the northernmost States; our cotton crop could perhaps have been doubled, and our garden and field crops have regularly yielded a steady return to the producer.

In England, where less attention has been paid to practical zoölogy than with us, increased interest is taken in this subject. A botanist has just been appointed to the Royal Agricultural Society, and an entomologist will soon be elected.

INSECTS INJURIOUS TO FIELD CROPS.

The Onion Thrips.—About the middle of August my attention was called by Mr. B. P. Ware of Swampscott, to his serious loss of onions from the attacks of a minute insect. The leaves were observed to suddenly turn yellow and wilt, and the plant died. In this way large patches became infested and turned yellow, until in two or three days these prolific insects spread over the whole field. They seemed to increase most rapidly during the unusual dry, hot weather that we experienced about the middle of last August. On the 11th of August a whole acre was thus cut off. Mr. Ware informed me that the onion plants have been more or less infested in this way for some fifteen years, but

the damage done this year was greater than ever before. This evil seems wide spread in Essex County, as not in Swampscott alone, but in Lynn, Salem, and parts of Danvers, the onion crop has been similarly infested. About $100,000 worth of onions are raised in Essex County alone, and Mr. Ware judged that at least a tenth part was destroyed by this new pest; so that in one county alone and by one kind of injurious insect we have in one season lost $10,000. The onion crop is next to the hay crop in value, as it is sold for cash.

On examining the specimens brought into the Museum of the Peabody Academy of Science, the leaves were found to be covered with hundreds of a minute Thrips, which by gnawing the surface of the leaves, had caused them to turn white in spots, and subsequently yellow; where they were most numerous the outer skin of the fleshy leaves was entirely eaten off, and though it was difficult to imagine that so minute insects could have caused the death of so stout and thick-leaved a plant, yet here were hundreds of the culprits in all stages of growth plying their jaws before our eyes in proof.

This insect, which occurred in both sexes and in all stages of growth from larvæ of minute size, proved to be the wheat Thrips of Fitch (*Limothrips tritici*), who gives an account of its appearance and habits in his "Second Report on the Noxious, etc , Insects of New York," p. 304. His attention was first called to this insect by a correspondent in Wisconsin, who found them in great numbers in blossoms of various plants. He wrote Dr. Fitch that they first "made their appearance about the middle of June, or at least they were then first noticed, so far as I have heard. For about two weeks they were found in the blossoms of wheat and of clover, causing numbers of the blossoms to wither, and in some cases the kernel was also attacked." Dr. Fitch himself never seems to have noticed this insect in New York, nor that it has ever been found in the onion, but thinks it is the species to which Dr. Harris refers in his treatise. In that work the author speaks of a "pernicious insect in the ears of growing wheat," which "seems to agree with the accounts of the Thrips cerealium which sometimes infests wheat, in Europe to a great extent." From his brief description it is probably the insect now under consideration to which Dr. Harris refers.

The various kinds of Thrips are minute, narrow-bodied insects seldom exceeding a line in length, and remotely allied to the

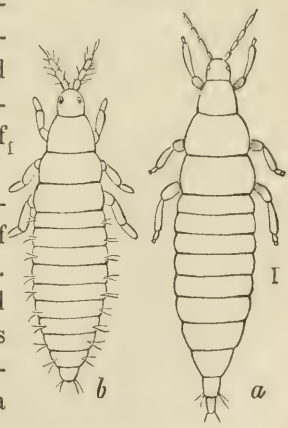
bed bug and squash bug in structure, but differing from them in having free jaws adapted to biting, while those of the bed or squash bug form with the other mouth-organs a sharp, hard beak, with which they puncture leaves or the flesh of their victims, when carnivorous in their tastes. These Thrips are further distinguished by their wings being very long and narrow, and beautifully fringed; and when folded over their back they do not conceal the body beneath, as is usually the case. Moreover, they are exceedingly active in their habits, running or leaping like fleas.

The females alone are winged, the males being wingless and closely resembling the larvæ. The body of the female is smooth and shining, uniformly greenish yellow, with no other markings; the legs are a little paler towards the articulations. The antennæ are 8-jointed, slightly longer than the head; the two basal joints are the largest; the three succeeding joints equal, regularly ovate, the 6th a little longer than the 5th; 7th and 8th minute, 7th a little shorter than 8th, each joint bearing four large bristles. This species differs from the European *L. cerealium* in having but eight joints, the 7th and 8th being minute, and with no intermediate short one, as described in the European insect.

FIG 1. *Limothrips tritici* (fem).

The prothorax is square, the scutellum short, crescent-shaped, and the abdomen is long and narrow, smooth and shining, 10-jointed. Length, four one-hundredths of an inch, or less than half a line.

FIG. 2.



Larva and male of Limothrips tritici.

The larva (Fig. 2), is entirely greenish-yellow, the head and prothorax of the same color as the rest of the body. The eyes are reddish. The feet and antennæ are whitish, not annulated, as in *L. cerealium*. The feet (tarsi) consist of but a single joint ending in a point.

The male differs from the larva in having 2-jointed feet (tarsi) and

End of antennæ of male.

7-jointed antennæ, those of the larva being 4-jointed. The second joint is exactly barrel-shaped, with two ridges or lines surrounding it, 3d and 4th joints long, ovate, the 3d being a little larger than the fourth, and with about twelve transverse lines, there being about eight on the 4th joint, from the end of which projects a remarkable tubercle, as seen in the figure. The 5th joint is square at the end, with about eleven transverse lines, and three or four stout hairs externally; 6th joint minute and spherical, while the 7th is three times as long as the 6th, and is finely striated, and with four unequal stout hairs. It is just twice the length of the female, measuring .08 inch.

The best remedy of a preventative nature against further ravages, after this insect has made its appearance, is to build a bon-fire upon the diseased patch, pull up the onions about, and throw them into it. By thus sacrificing a few onions at the outset, the evil may be nipped in the bud. For remedies less effective we would recommend showering the plants with strong soapsuds, or sprinkling them with sulphur, or the use of a solution of copperas, such as is used in killing the currant saw-fly, *i. e.*, a solution of a pound of copperas to ten gallons of water. The use of a carbolate of lime or air-slacked lime may also be recommended.

A heavy shower of rain will cause them to disappear for a while, and they probably only appear in such overwhelming numbers as this past year in consequence of the summer being an unusually dry and warm one.

The Onion Fly.—This maggot, which attacks the roots of the onion, is as abundant and destructive as ever. Its work, however, ceases about the time the Thrips is most abundant. The maggots make their appearance in Essex County about the middle of May, and by the third week in August most of them change into the pupa or chrysalis state. As a preventative measure worth adopting is one suggested to me by Mr. Ware, *i. e.*, to sow the seeds two inches deeper than usual so that the fly cannot so readily get to it to lay its eggs.

The Imported Cabbage Caterpillar and its Parasite.—This caterpillar was fully described, and its habits and ravages fully set forth in our last year's report. During the past summer it

has been fearfully abundant in gardens in Eastern Massachusetts. Were it not for the ichneumon parasite (Fig. 3, *a*, male; *b*, female; *c*, larva; *d*, pupa), which has been found to prey upon it very extensively, the cultivation of the cabbage would have to be given up in some districts. This invaluable ichneumon is one of the Chalcid family, and is the *Pteromalus puparum* of Linnæus. It is well known that the cabbage caterpillar (*Pieris rapæ*) was introduced into this country about the year 1857. I had supposed that the parasite had perhaps been imported with its host, but now find that it is undoubtedly a native of this country as well as Europe. Having been favored by Mr. Francis Walker with specimens of both sexes from England, labelled by him Pt. puparum, I found that our specimens did not differ specifically. Further, Mr. Walker wrote me that there were specimens of the same species in the British Museum taken in Hudson's Bay territory in 1844. During the past summer Mr. P. S. Sprague sent me specimens which had been raised from the Rape Caterpillar in Vermont. Mr. J. A. Lintner has also published a note in the "American Naturalist" stating that he had reared this parasite from the same kind of caterpillar, and previously to this Mr. S. H. Scudder had received numerous specimens from Mr. A. G. T. Ritchie of Montreal, Canada, who, if I understand his letter aright, first observed these chalcids upon the cabbage leaves in July, 1870, when the caterpillars were abundant. On the 23d of August of the same year he had some of the parasites hatch out. To Mr. Ritchie, then, is due the credit of being the first to make known the history of this invaluable insect.

FIG. 3.
Parasite of the Imported Cabbage Butterfly.

So that the parasite seems to cover even a wider field than its host, and probably preys on our native cabbage butterfly, the *Pieris oleracea*, as in Europe it preys on *Pieris brassicæ*, the caterpillar so destructive to the cabbage there.

The male of this Pteromalus is a beautiful pale-green fly, with the body finely punctured and emitting metallic tints; the abdomen, or hind body, is flat, in dried specimens with a deep crease along the middle of the upper side, and it is much lighter in color and with more decided metallic reflections than in the rest of the body. The antennæ are honey yellow, with narrow black wings. The legs are pale honey-yellow. It is .08 inch to a tenth in length.

The body of the female, which would be thought at first to be an entirely different kind of insect, is much stouter, broader, with a broader oval abdomen, ending in a very short ovipositor, while the underside of the body near the base has a large conical projection. It is much duller green than the male, and the body is more coarsely punctured. The scutellum of the metathorax is regularly convex, not keeled, in both sexes. The antennæ are brown, and the legs brown, becoming pale towards the ends, the ends of the femora being pale; the tibiæ pale-brown in the middle, much paler at each end, while the tarsi are whitish, though the tip of the last joint is dark. It is from a line to a line and a third in length. It differs from Harris' *Pteromalus vanessæ* in the little piece known as the scutellum of the metathorax being smooth, not keeled, and by its darker legs.

The larva is a little white maggot about a sixth (.17) of an inch in length. The body consists of thirteen segments, exclusive of the head, and is cylindrical, tapering rapidly towards the head, while the end of the body is acutely pointed. The chrysalis is whitish, the limbs being folded along the under side of the body, the antennæ reaching to the end of the wings; the second pair of legs reaching half way between the end of the wings and end of abdomen; while the tips of the third pair of feet reach half way between the second pair of feet and the end of the abdomen. It is from a line to a line and a third in length.

In the middle of September Mr. F. W. Putnam handed me one hundred and ten chrysalids, all but two of which were infested by these parasites in both the larval and pupal states; while from other chrysalids the adult chalcid flies were emerging. They continued to emerge until late in the autumn. The infested chrysalids of the butterfly could be easily distinguished by the livid and otherwise discolored and diseased appearance of

the body, while those unattacked had preserved the fresh color, and the tail moved about readily; the diseased ones becoming stiff and more or less dried. Mr. Putnam thinks that at least two-thirds of the chrysalids of this butterfly, hundreds of which had in the early autumn suspended themselves about his house and fences, had been attacked by these useful allies.

On opening the body of the infested chrysalids I found about thirty parasites in different stages of growth, in one case thirty-two, in another only twelve. We can readily see how efficient these minute insects become in reducing the numbers of their hosts. A large proportion of the Pteromalus undoubtedly winter over in the body of the chrysalis, the adult insects appearing in the spring. In England Mr. Curtis found the fly in June, so that evidently there is an autumn and spring brood of flies.

Another parasite is the larva of a parasitic fly, Tachina (Fig. 4, enlarged three times), the adult form of which closely resembles the common house-fly. It is a flattened, cylindrical maggot, both ends of the body rounded much alike. The mouth-parts are partly aborted, there being only two retractile horny mandibles by which the fatty portions of its host is eaten.

FIG. 4.
Larva of Tachina.

Besides this large Tachina I found a minute fly in the same bottle with a number of the chrysalids of the butterfly, and am inclined to think that it may have lived parasitically in them, but would not be confident that it is so. It is a small black fly, about a line in length, and with dark wings.

The Cabbage Web Moth.—My attention was first called to this moth, now almost cosmopolitan in its distribution, in September and October, 1870, at the Agricultural College at Amherst. The little green caterpillars were quite abundant on the under side of the outer leaves of the cabbages on the college farm, and their web-like, delicate cocoons were found attached to the leaf in depressions or folds. Afterwards a correspondent in Michigan sent me specimens of the worm, the cocoon and moth, stating that it was doing great damage to the cabbages there. The season at Amherst, as all over New England in 1870, was

very warm and unusually dry, which accounts for the unusual increase in this insect.

This insect, well known in Europe, whence it has been carried all over the civilized world, was first noticed in this country by Dr. Fitch in 1855, who gives an account of it in his "First and Second Reports," &c., having observed it in Illinois, but not in New York. He called it *Cerostoma brassicella*, but it is undoubtedly the well known European *Plutella xylostella* Linn. (Fig. 5, moth and cocoon). Though the insect has been observed in this country only late in the autumn when the cabbages have headed, yet these worms, as Dr. Fitch suggests, probably belong to a second brood. Stainton, in his "Manual of British Butterflies and Moths," states that the moths fly in May and August, while the caterpillars appear in June, July, and a second brood again in September. Dr. Fitch suspects that the first brood of caterpillars may feed on the young cabbage plants in early summer, and thus do more mischief than in the autumn when the heads are fully formed.

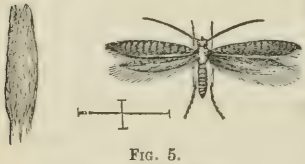


FIG. 5.
Cabbage Web Moth.

The caterpillar is a little pale green worm, with small, stiff, dark hairs scattered over the body; it is a quarter of an inch long. When about to transform it spins a beautiful open network of silk as a cocoon, open at one end, of white silken threads; it is a third of an inch long.

The moth itself is pale gray, with the head, palpi and antennæ white, but the latter are ringed alternately with white and gray on the outer half. The rest of the body is gray, except on the under side, and on the middle of the thorax, where there is a broad, white, longitudinal band, which when the wings are folded is continuous with the white band along the inner side of the wings. The two front pair of legs are gray, with the tarsal joints ringed narrowly with white; the hind legs are whitish and hairy. The fore wings are gray, with a conspicuous broad, longitudinal, white band along the inner edge, and extending to the outer third of the wing; this band sends out three teeth towards the middle of the wing, the third tooth being at the end of the band. There is a row of dark dots along the outer edge of the stripe; a row of blackish dots along a pale shade just outside of

the front edge of the wing, and two diverging rows of blackish dots diverging upon the tip or apex of the wing. The fringe is marked with a few dark spots. The middle of the wing next the white band is darker than the front edge, while a faint yellowish shade runs along the middle of the outer half of the wing towards the tip, enclosing a few black dots. It expands a little over half an inch.

Should young plants be attacked by the worms, the best remedy would be to shower them with soapsuds. For the autumnal brood of worms the plants should be plentifully showered; and if this is not efficacious, the worms should be picked off by hand, the cocoons especially.

The Radish Weevil.—About the year 1857 I found in Maine upon the radish leaves a specimen of a weevil, which I cannot distinguish by Curtis' description and figure from the European *Ceutorhynchus assimilis*, Payk. Fig. 6, *a*, beetle, *c*, larva, *b*, pupa, *e*, pod with hole out of which the grub has come, *d*,

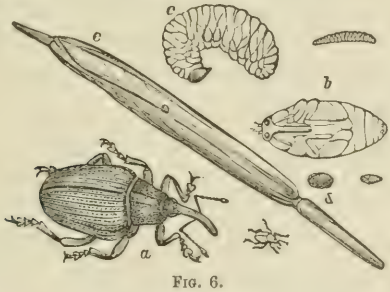


Fig. 6.
Radish Weevil.

Fig. 7.

earthen cocoon. (From Curtis.) (Fig. 7 drawn from an American specimen).

As it has not before been noticed in this country, and may become in future years more or less of a plague, we give a brief description of the insect and its habits.

The beetle is minute and pale-gray, with a remarkably long, slender, curved snout, from the middle of which arise the long elbowed, slender antennæ; the basal joint is long and slender and succeeded by seven spherical joints; the oval club pale at tip, consisting of four joints. The body is black, but so densely covered with gray, flattened hair and scales, that it seems to be uniformly

pale-gray. These hairs become broad, flattened scales on the sides of the body. The prothorax is triangular, seen from above, swollen on the sides, and the head, exclusive of the snout, is very small. The body behind is unusually broad; the wing-covers have each nine (Curtis mentions only eight) longitudinal, fine, punctate furrows, the ridges between being much flattened. The legs are rather short, and pale-gray like the rest of the body. Curtis mentions that the hindermost thighs have a short, thick tooth beneath. I find one on the thighs of both the middle and hind legs. However, the insect may be considered as identical with the European species, until proved otherwise by comparison of specimens, as it has probably been imported in radish and turnip seed. In Europe this weevil was first observed among turnip seed, where as a white maggot it devours the seed in the pods. When fully fed it gnaws a hole through the side of the pod, out of which it escapes, and makes its way into the ground two or three inches below the surface, where it forms a brown, oval cocoon of the grains of dirt. Here it remains three weeks in the pupa state, and by the third week in July the beetle appears. Mr. Curtis, whose account we have reproduced, thinks that the female lays its eggs in the embryo pods.

The Pitchy-Legged Weevil.—Another weevil has for several years been not uncommon in Essex County, which in England, from which it has been imported, is often, as Mr. Curtis says, "a dreadful pest in gardens, committing sad ravages on vines in hot-houses and on wall fruit, during the night, when they emerge from their hiding-places in old walls, from under the bark, and clods of earth, to revel upon the branches of the new wood in April, or to feed upon the young shoots, which soon become black. They likewise injure raspberry plants in spring, by eating through the flowering stems and leaves, and they nibble off the bark, and eat out the buds of apple and pear trees as early as February or March." But they are said by Curtis to do still more damage to pease, turnips, and young winter-plants, as savoy, kale, broccoli, &c.

I have detected this weevil on the Beach Pea during the last week in July, and it is not uncommon in gardens, and even, if I

am not mistaken as to the identity of the insect, will enter ferneries and nibble the ferns and make considerable havoc among the plants before its presence is suspected.

This insect, which is likely to prove annoying, is the *Otiorhynchus picipes* of Fabricius (Fig. 8, enlarged). The body is pitchy brown, and covered with microscopic, pale scales, resembling a scallop shell, being marked with a few prominent ribs. Indeed, many of the weevils seem to be provided with scales like those of butterflies, Poduras, and a few other insects. The beak, so short and slender in the radish weevil, is here broad and short, square at the end, from which the elbowed reddish-brown antennæ arise. The head is a little darker than the rest of the body, and is coarsely punctured. The prothorax is coarsely granulated, the granulations being arranged in irregular rows. The wing-covers are adorned with about eleven high, rounded, longitudinal ridges on each cover, and with coarse punctures along the furrows between them. There are also about twenty rows of pale dots along the wing-covers, consisting of scales. The legs, including the claws, are rather paler than the rest of the body. The body is also covered with scattered pale hairs bent down on the surface, especially on the top of the head; these hairs remain after the scales are rubbed off. It is a quarter of an inch in length.

FIG. 8. *Pitchy-Legged Weevil.*

INSECTS INJURING THE RASPBERRY.

The Raspberry Saw-Fly.—In an article contributed to the report of the Board of Agriculture for 1870, and entitled "Injurious Insects new and little known," I incorrectly stated that a little beetle, the *Byturus unicolor*, ate holes in the leaves of the raspberry, as well as the flowers. Mr. F. W. Putnam has since drawn my attention to the fact, which my own observations have corroborated, that two insects produce the mischief: the beetle eating the fruit-buds and flowers, while the injuries to the leaves are caused by the larva of a saw-fly—the *Selandria rubi* of Harris (Fig. 9, and larva, both enlarged), who first noticed it in 1845.

The worm is cylindrical, like a caterpillar in appearance, being quite unlike its congener, the viscid pear slug, the body being covered with fine hairs, giving it a somewhat velvety aspect. It is pale-green, with "six dorsal rows of tubercles, having two black bristles and four lateral ones on each side bearing white bristles." Mr. E. Norton, from whom I have quoted, and to whom I am indebted for a single female for description, and to serve as a subject to be drawn for the above cut, farther remarks in his treatise on this family of insects, that the false caterpillar appears in May. I have seen it early in the summer, in my garden. From its habit of feeding early in the morning or at night, it is scarcely seen, and is difficult to reach. The bushes, however, should be well shaken, and such leaves as have been riddled by them carefully examined, as the worms may often be thus detected.

FIG. 9.—*Raspberry Saw-Fly and Larva.*

The adult female fly is shining black on the head and thorax, while the tips of the mandibles are reddish and three-toothed. The shoulder-tippets (tegulæ) and base of the wings are honey yellow, while the wing veins are brown. The legs are honey yellow; the thighs (femora) brownish, as also the tips of the hind tibiæ. The third, fourth and fifth abdominal rings are pale-yellow, the remainder of the abdomen being brownish. This insect differs from the female of the well known rose saw-fly, which is almost entirely black, in the broad light band on the abdomen, in the paler veins of the wings, the different form of the cells, the thickened spot (pterostigma) being less rounded, and in having paler legs. It is also a little larger, measuring just a quarter of an inch in length.

INSECTS INJURIOUS TO FOREST TREES.

The Chestnut Weevil.—The chestnut is often infested by a large white maggot (Fig. 10, larva of Balaninus and chestnut infested), with a yellowish head, which attains its full size at the time the nuts drop. It is found in nuts sent to market, and it is probable that while some of the maggots gnaw their way out, and enter the ground in the autumn to transform, others delay until the spring. Its habits, however, are not known, nor even whether it be the same as the weevil of acorns, which has been proved by Mr. Riley to be the young of the *Balaninus rectus* of Say. We introduce from Dr. Harris' "Treatise on some of the Insects Injurious to Vegetation" a cut of *Balaninus nasicus* (Fig. 11), which is either the parent or closely similar to the parent of the chestnut maggot.

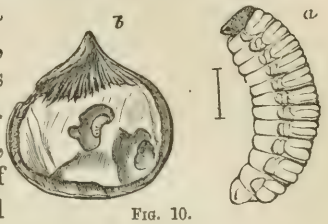


Fig. 10.
Chestnut Maggot.

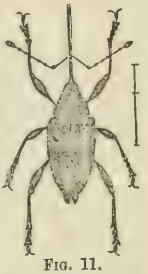


Fig. 11.
Balaninus nasicus.

The Chestnut Borer.—The chestnut tree itself is remarkably free from borers, and no insect has hitherto been known to bore into the trunk. My attention has, however, been called by Mr. R. B. Grover, a student in the State Agr. College, to the fact that the *Arrhopalus fulminans* Fabr. (Fig. 12, enlarged twice), one of the family of Longicorn beetles, bores in the trunk. I know nothing farther concerning its habits, nor of the appearance of its grub. The beetle itself is blackish brown, with slight dark-blue reflections; the legs and antennæ are of the same color, the latter being scarcely larger than its body. The top of the head, and the sides of the prothorax, and under side of the body, are covered with a pale-gray pile,

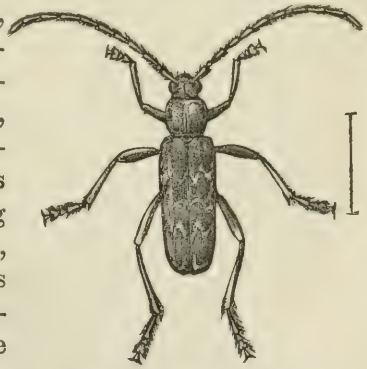


Fig. 12.—*Chestnut Borer.*

while certain silver markings on the wing-covers are composed of similar close-set, fine hairs. Those hairs on the sides of the prothorax enclose a conspicuous black spot, while the top is black, and more coarsely punctate than the wing-covers. The latter are each crossed by four acutely zigzag lines, composed of microscopic hairs, forming w-like bands on the elytra, the basal lines being less distinctly marked than the others. The ends of the wing-covers are also tipped with gray, especially on the inner side of the end. The legs are pitchy brown with light hairs, and with a reddish tinge on the terminal joints (tarsi). It is a little over half an inch long.

The Oak Callidium.—This is also a new borer in the oak, specimens having been taken by Mr. Alfred Poor from a white oak stick, June 20th, and presented by him to the Essex Institute several years ago. It is undoubtedly closely similar in its habits and in the form of the larva to the Grape Callidium figured in our last report. This is the *Callidium variabile*, and is one of our more common species of the genus. It is closely allied to *C. amœnum*, but is larger, and less coarsely punctured, while the antennæ are more reddish; the scutellum is concolorous with the wing-covers. The body, legs, except the femora, which are blackish in the middle, and antennæ, are reddish, the tips of the joints of the latter dark, and on the back of the prothorax are two black spots, often confluent. The head is black. The wing-covers are prussian blue, smooth, finely punctured, with rather thick, fine, black hairs, bent downwards. Specimens recently changed from the pupa state are brown, and the species is exposed to considerable variation, as its name indicates. The male is just half an inch long, the female .60 inch.

The Black Elm-Tree Borer.—This is a new borer in the elm, a tree also remarkably free from borers. I am indebted to Mr. G. D. Smith, of Boston, from whose immense collection of beetles the specimen I here describe was taken and given to the museum of the Peabody Academy. It is the *Physocnemun brevilineum* Say (Fig. 13, nat. size). It is a singular-looking beetle, with a round, flattened prothorax, and wing-covers contracted in the middle, and not covering the tip of the abdomen,

while the thighs are unusually swollen. The antennæ are about two-thirds the length of the body, flattened towards the end, and somewhat serrate. The body above is velvety black, and brown-black beneath. The head is black, and coarsely punctured, and the prothorax is covered with short, dense, black hairs, like velvet. The wing-covers are Prussian blue in color, bent, corrugated, with an interrupted ridge just outside of the middle of each cover. They are covered with fine, black hairs, bent over. There is a pair of parallel, short honey-yellow lines in the middle of each wing-cover, with a third one a little in front, making in all six streaks. The legs and feet are black. It is a little over eight-tenths of an inch in length.

FIG. 13.—*Elm-Tree Borer*

THE COUNTY SOCIETIES.

The returns of the various county societies, an abstract of which is presented as the second part of this report, indicate a high degree of prosperity. The policy, which has now been adopted by nearly every society, of owning land and fixtures, has involved many of the associations in debts of varying amounts, but in most cases the real and personal property greatly exceeds the debts, while, in prosperous years, a considerable reduction of the latter is quite practicable. It must be apparent that any considerable amount of liabilities is a source of embarrassment, curtailing the usefulness and efficiency of a society, and preventing many expenditures which are desirable and calculated to promote the good of the community.

The amount set apart for the printing and distribution of the Transactions, for example, is, as a general rule, far too small. The volume of Transactions is the permanent record of the society, the standard by which it will be judged in the future, and

the means of conveying instruction to the public. Money judiciously invested in publication is better calculated to promote the objects for which the society was organized, than money distributed in small cash premiums. If it goes out in driblets, it is not likely to accomplish any permanent results.

The value or efficiency of a society depends chiefly upon the management. If it adopts a low standard of excellence and aims to do all its work and accomplish its objects through the bluster of its exhibition, which lasts but a day or two at most, it can hardly expect, with any show of reason, to rouse the spirit of inquiry and improvement, and to do the good which the State had in view when it granted its charter and endowed it with the annual bounty from its treasury.

The show is ephemeral at best. It is no doubt a good thing, so far as it goes, to get people together, and to furnish them the means of rational enjoyment, social intercourse and instruction. Some societies stop here. They see no duty higher than this. Their capacity seems to exhaust itself with one spasmodic and tremendous effort. The idea of any latent possibility of benefiting the public by exciting thought and emulation, or by a search after new facts and the discovery of new truths, seems not to enter into their programme of operations. The encouragement they give for accurate experiments designed to improve the processes of farming or to develop the material interests of the people, bears no proportion to what they give for trifles light as air.

Now that a society is capable of acting on a higher level, and adopting higher aims, and attaining greater results than many of our societies do, is clear enough, because it has been done, and is done every year, by some societies, and can be done by any one that will go the right way to work. To ascertain this right way, with all local considerations taken into view, a committee to investigate and report some complete plan of operations would be able to suggest what reforms are needed. They would have the advantage of the experience and history of those societies whose success has been most marked. They would find out how committees on different subjects are made up, and how it is that exhaustive and well-considered reports are the rule in all well-managed societies, rather than the exception. They would learn what means are taken to create an

interest in the prosperity of the society throughout the farming community. They would be able to devise methods of varying the premium list, or to suggest changes in the mode of awarding prizes. Their report might be expected to contain many practical suggestions by which the usefulness of the society would be greatly increased, and through which it could return to the people of the Commonwealth some fair equivalent for the bounty that has been bestowed upon it.

I often hear the officers of societies complain that all the work falls on one or two individuals; that the people do not take hold and do the work; that it is difficult to get up any enthusiasm: as if this were any explanation of the torpidity of the society. If such a state of things exists, who is responsible for it? Is it not the fault of the management itself? Has there been a rightly directed effort to "bring out" the young men, or have they been left out in the cold? If an orator is to be chosen, has he not been called from abroad, in the shape of some lawyer, or minister, or politician, instead of giving the native, and perhaps too modest, talent of the society itself, an opportunity to make its appearance? If a display is to be made at the annual dinner, is there sufficient dependence upon the members of the society, or has the management looked abroad for higher-sounding names?

One of the grandest missions which a society has it in its power to accomplish is the education, the bringing out, so to speak, of a class of young men, farmers' sons, and leading them to feel that there is a work for them to do. Nothing builds up a young man so rapidly as responsibility. The mere opportunity is hardly enough; modesty may compel him to shrink from seeking it, but once thrust it upon him, and he grows up to it in a manner which often astonishes himself. He discovers in his own mind, resources of which he, perhaps, did not even know the existence. Success teaches him self-respect, and confidence in him gives him character.

Now if this class of the members of a society had been persistently encouraged through a period of ten years, how could there be any need of co-workers in the objects and purposes of the institution? How could there be any serious difficulty in finding suitable men to act as chairmen of important committees, —men both willing and capable of writing instructive and useful

reports,—and to aid in building up the reputation and influence of the society? A society ought to aim not only to make better farmers, but better men; and it can do it by encouraging the growth of native talent and relying more upon home products.

Nothing is more true than that progress is as essential an element in associated action as it is in the natural world. No society, any more than an individual, can remain stationary. If it does not make constant and persistent effort to advance, it will be sure to retrograde. If it does not constantly grow better, it will be quite sure to grow worse. It is therefore its duty to progress, to do more and to be more from year to year, than it ever was before.

It cannot be denied that our agricultural societies have, as a whole, been of vast benefit to the material interests of the Commonwealth. Apart from the merely social and educational influences which they have exerted, they have done much to improve both our stock of domestic animals and our modes of practical farming. If, as some pretend to affirm, the actual number of horned cattle has decreased in some sections of the State, it cannot be denied that the quality of those we have, and their actual money value, have been materially enhanced. This addition has come chiefly from the introduction of improved breeds of cattle, and the extensive use which our farmers have made of them in obtaining grades which have been raised up to take the place of much of our old native stock.

As an example of this gradual change, a large part of it due directly or indirectly to the encouragement given by the societies and to the opportunity which their exhibitions afford to display improved stock, and gain the credit which is sure to follow such enterprise, it may be stated that twenty years ago, there were but seventy-five pure-bred Jersey cattle in the State. I knew at that time every herd owned among us, and took pains to collect the facts about them. If I recollect aright, there was then but one herd of them west of the Connecticut River, and in the eastern part of the State they were but little known. Now there are single herds containing a greater number than that, and many a town which contains more pure-bred Jerseys than could have been found in the whole of New England at the time of the publication of my first annual Report. In addition to this, the grade or half-bred Jerseys are very common in

almost every part of Massachusetts, and their characteristics and peculiar fitness for the butter dairy are generally understood and appreciated.

The same may be said of nearly every other pure breed of animals originally imported from Great Britain, though some of them are better known and chiefly confined to more limited localities especially adapted to them. The number of extensive and enterprising breeders of Ayrshires has increased in a similar proportion within the last twenty years, and both pure-bred and grade animals of this breed are almost universally diffused throughout the Commonwealth. There can be no reasonable doubt that the average animal products of our dairy and other stock have been considerably increased in consequence of this improvement.

Nor should it be forgotten that better and more humane treatment has gone hand in hand with this general change and improvement in our stock. If a farmer has an animal in which he takes a peculiar pride, or in which he feels any special interest, he will naturally feed it a little better, give it a little better shelter and attention, than the common stock of the country used to get a quarter of a century ago. I have no doubt that the general treatment of all our stock is vastly better than formerly, and that this improvement is to a very considerable extent due to the introduction and keeping of the improved breeds of cattle.

A generous ambition to excel in stock, or to keep only the best, has its influence, also, in other ways. It is both the result of and the incentive to increased enterprise and thrift. How far the general improvement in farm buildings may be ascribed to this source it may not be easy to determine, but it is natural to suppose that it has had some connection with it; that is, that better barns are the result, in part, of greater intelligence and a greater knowledge of the animal economy. A very large proportion of the barns throughout the State are provided with commodious cellars, and most farmers would about as soon think of building a house without a cellar as a barn, so important is this convenience regarded in the economical management of the farm.

These general improvements in the farming districts are a source of just pride and gratification, and they seem to furnish

a sufficient answer to those who say that our soil is sterile, our climate inhospitable and our agriculture in the decline. If this were true, our farming population furnishes a very striking anomaly, for statistics show that, with reference to most of the staple products of this country, the yield of an average acre in Massachusetts is greater than that of any other State, and that the money value of the product of an average acre is greater; while any impartial traveller with an extensive observation both throughout the United States and the best farming districts of Europe, would admit that there is no farming community in the world presenting, as a whole, and with fewer exceptions, greater evidences of thrift, prosperity, enterprise and comfort, than our own. There may be, and there doubtless are, wealthier communities, countries where the landed property is concentrated and held in fewer hands, but for a free people, working their own farms, and dependent upon their own honest labor alone, it seems to me our country towns present the practical proofs of a remarkable material prosperity, which is at once the result and the criterion of success.

CHARLES L. FLINT,
Secretary State Board of Agriculture.

Boston, January 24, 1872.

APPENDIX.

REPORTS OF DELEGATES

APPOINTED TO VISIT THE

AGRICULTURAL EXHIBITIONS.

ESSEX.

In accordance with the assignment of this Board, I attended the fifty-first annual exhibition of the Essex Agricultural Society, at Ipswich, commencing on Tuesday, September 26th. Notwithstanding the unpromising state of the weather, a large crowd of people assembled at an early hour.

Contrary to the almost universal custom of our other agricultural societies, Essex has not seen fit to purchase and fence grounds upon which to hold her annual fairs, but chooses rather to hold them, from year to year, throughout the principal towns of the county, and by this means a lively interest for her success is kept up among the members, and but little disposition to form other societies, within the limits of the county, is entertained.

Upon the grounds used for the fair, a spacious tent had been erected, under which all farming tools and implements could be shown, as also plenty of pens for the reception of stock.

I walked to the hall where the annual meeting for the choice of officers was in session. I could see that the utmost interest was felt for the welfare of the society, by the large attendance of its members at this meeting. After its adjournment, I returned to the grounds in company with its president, General Sutton, and examined the show of stock. The exhibition, in this department, was not large, but most of the animals were of fine quality, especially the herd of Jerseys of Francis Dane, and the Jerseys and Ayrshires of the Messrs. Appleton.

It affords your delegate great pleasure to say, that in numbers, blood, condition and style, the show of horses and colts was the finest he had ever witnessed at any county fair; and the exhibition was even more gratifying when we consider that the trotting-track,

always considered so indispensable, was not needed by this society to bring out this display.

The show of sheep was also excellent, although not extensive. The flocks of Mr. Dane and the Messrs. Appleton would be creditable to any society.

There were but few lots of swine, but the quality of these fully compensated for the lack in numbers.

The exhibition of poultry was large and complete, comprising almost every well-known variety. A large collection of agricultural implements was on exhibition under the tent.

We were particularly pleased with the display of fruit, especially with the pears and grapes.

The display in the vegetable department was most excellent. The farmers and gardeners of Essex understand what is required for a good market vegetable, as these specimens bore evidence.

The products of the dairy were not largely represented, but the butter was, for the most part, well manufactured, and of a fine quality. The exhibition of domestic manufactures and articles of taste was admirable.

Your delegate did not stay to witness the proceedings of the second day, owing to the appearance of the weather, together with the fact, that the fair of the Worcester West was to be held on the succeeding day; and it is to be greatly regretted that we were therefore unable to witness the ploughing match, but have been informed that there were a considerable number of entries, and the work was skilfully done.

On inquiring into the condition of the society, I found that it was not for the lack of means that the society did not own grounds or buildings, since they have at present over twenty thousand dollars in controllable funds. Over fifty years ago this society was established, with the view to improve the agriculture of Essex County; and how to most effectually accomplish this has ever been their study.

It is now a strong and independent society, with over twelve hundred members, representing every town in the county, offering liberal premiums and circulating yearly nearly a thousand copies of their annual report. The circulation of these has, no doubt, had an abiding influence upon the agriculture of the county, by introducing better modes of farm management, more improved tools and implements, and by leading to the investigation of methods for improving farm stock, of adapting crops to soils, as well as of improving the soils themselves.

And, in conclusion, I would say, that I know of no society which

has done more, in the past, to promote agriculture, and I know of none which is more able, in the future, to advance this cause; and I have no doubt but that it will be powerful for good to the farmers of that community, so long as it has such a man as General Sutton for its president.

JOHN T. ELLSWORTH.

MIDDLESEX.

The seventy-seventh annual exhibition of the Middlesex Agricultural Society, the oldest incorporated county society in the State, took place on their ample and conveniently-located grounds, in the beautiful town of Concord, on the 27th and 28th of September, 1871. I am at a loss to know how to report this most excellent exhibition, without seeming to exaggerate its real merits. That it was the best I have witnessed I am confident; and I cannot conceive how it could have been improved. Every department was full and complete, and of the highest order of excellence, showing that there must be good soil and thorough cultivation within the bounds of the society, and fully illustrating the correctness of the theory laid down in the valuable Essay on Market Gardening, presented to us by the secretary of the society, and our worthy associate at our last annual meeting of this Board. But the secret of this society's success, I am satisfied, lies in the energy of its guiding minds, arousing into active coöperation all the available forces at their command, joined with an untiring zeal on their part to make each exhibition one of comfort and profit to contributors, and of pleasure to all.

The entries of cattle were large, requiring more than one hundred pens to accommodate them, among which were many choice specimens of thoroughbred and grade stock. The Ayrshires were most numerous, and no one could mistake their great milking qualities. The fawn-like Jerseys were well represented in quality and numbers. The Dutch were represented by the fine herd contributed by Mr. Chenery and others. And Mr. Clark was there with his beautiful "Swiss Bell-ringers," which were among the greatest objects of attraction. Durhams and Shorthorns, and fine herds of grade milking stock, that would do credit to any part of the State, and the great number of splendid bulls and fine young stock, all warrant the continued success of this society in the future. Fat cattle and working oxen also had their representatives.

Swine were few in number, but good in quality. The show of poultry was very superior; nearly every variety was represented, and showed careful breeding. The display of agricultural implements was quite extensive. The horse department was said to be on a par with the other departments. The flower and domestic departments were alike creditable to the taste and industry of the good ladies of Middlesex. Fruits and vegetables were abundantly displayed, and of a wonderful quality; and I venture to say the display has never been excelled in Massachusetts.

The annual dinner took place on the last day, in the spacious dining-hall of the society's building on the grounds. The tables were plentifully supplied, around which were gathered the beauty and manliness of Old Middlesex. After feasting the inner man, the noble and whole-souled president of the society, John Cummings, Jr., began the "feast of reason" by bestowing appropriate congratulations and praises upon the farmers of Middlesex for the present success and welfare of the society, and offering the strongest encouragements for the future. Excellent addresses were then made by the Hon. Marshall P. Wilder and Ralph Waldo Emerson, fresh from the mountains and plains of California, and by other well-known friends of the agricultural interest in Middlesex.

The cheering words and presence on this occasion of Mr. Emerson, whose interest in agriculture has made his name as well known to the farmers of Middlesex as his refined and philosophical teachings have familiarized him with the best thinkers of the world, recalled to mind those admirable lines in his poem Musketaquid, descriptive of the dwellers in the Valley of the Concord, with which I close this report of the exhibition of 1871:—

"Beneath low hills, in the broad interval
Through which at will our Indian rivulet
Winds mindful still of sannup and of squaw
Whose pipe and arrow oft the plough unburies;
Here, in pine houses, built of new-fallen trees,
Supplanters of the tribe, the farmers dwell.
Traveller, to thee perchance, a tedious road,
Or, it may be, a picture; to these men
The landscape is an armory of powers,
Which, one by one, they know to draw and use:
They harness beast, bird, insect, to their work;
They prove the virtues of each bed of rock,
And, like the chemist, 'mid his loaded jars,
Draw from each stratum its adapted use
To drug their crops or weapon their arts withal.
They turn the frost upon their chemic heap;
They set the wind to winnow pulse and grain;
They thank the spring-flood for its fertile slime,

And, on cheap summit-levels of the snow,
Slide with the sledge to inaccessible woods
O'er meadows bottomless. So, year by year
They fight the elements with elements;
That one would'say, meadow and forest walked,
Transmuted in these men to rule their like,
And by the order in the field disclose
The order regnant in the yoeman's brain."

ELIPHALET STONE.

MIDDLESEX SOUTH.

The eighteenth annual exhibition of the Middlesex South Agricultural Society, was held at the Society's grounds in Framingham, September 19th and 20th. The absence of Hon. Albert Fearing, the appointed delegate, induced the society to call upon myself, a casual visitor, for a report upon its condition.

The exhibitions at Framingham are well known as among the most interesting in this Commonwealth. They have always been conducted with unusual skill and energy, by an efficient corps of officers, aided by an enterprising agricultural community. The exhibition of this year was fully equal to, and perhaps in advance of, its predecessors. Without entering into an elaborate description of the animals, vegetables, fruit and machinery on the ground, it is sufficient to say that all departments were well represented, and that they were all inspected by an interested and admiring crowd. The arrangements were excellent,—the president, George B. Brown, Esq., exercising a vigilant supervision over everything, and inspiring the occasion with his well-known enthusiasm. And he may well congratulate himself that within the limits of his society there are such herds of Jersey, Ayrshire and Dutch cattle, such admirable horses, poultry and swine, and such garden and field crops, as belong to the breeders and cultivators of Framingham and the surrounding towns.

It would be unjust to this society did I fail to call special attention to their annual report. A well printed and well arranged pamphlet of more than seventy closely printed pages,—it contains a fund of valuable suggestions and tables upon many matters of agricultural interest. The statements made by the exhibitors are well drawn, and are full of useful facts. We learn, for instance, that Mr. John Johnson, a member of this Board, estimates a corn crop as follows:—

Amount of corn raised to the acre, 93 bushels. Value of the

crop, including stalks and husks, $156.60. Expense of raising, $75.87. Profit on the acre, $80.73, and the cost of a bushel of corn, after making the proper allowances, to be 42 cents.

Mr. Josiah Gibbs makes the following statement: Amount of corn raised to the acre, 75 bushels. Value of crop, including stalks and husks, $115.05. Expense of raising, $56.90. Profit on the acre, $59.15.

Mr. S. M. Thomas makes the following statement: Amount of corn to the acre, 70 52-72 bushels. Value of the crop, including stalks and husks, $100.53. Expense of raising, $90.40. Profit on the acre, $10.13.

These estimates coming from one locality are extremely interesting and important. And the tables given of wheat and root-crops, are also worthy of careful examination. I would recommend the accuracy and care of this society to its associates throughout the Commonwealth.

GEO. B. LORING.

MIDDLESEX NORTH.

It will be recollected that by a special vote of the Board the Annual Fair of the Middlesex North Society was arranged with reference to the Annual Exhibition of the New England Agricultural Society. Your delegate visited the grounds of the society one day only during the progress of the fair. Every part of the Middlesex North Society, from its officers down to its smallest interests, seemed so thoroughly managed and absorbed in the New England Society, that your delegate was truly "lonely in a crowd," and he made up his mind that there was nothing for him to see as delegate; therefore he could enjoy the show as a member of the New England Society, waiving his official position for the time being.

There certainly was one element of the exhibition that was properly of the Middlesex North Society, of which your delegate feels that he has a right to say somewhat,—and that is what an Englishman would call "pluck."

From the inception to the end of the fair, it was evident to the most casual looker-on, that the officers of the local society meant *business*, and that if they found themselves "with an elephant on their hands" they were intending to do as Barnum did, "house him, care for him, and then make him work." It was found that more than ample preparations had been made for a crowd, and that the crowd came to occupy. Their own grounds, which were pretty extensive, had been increased to nearly twice the usual size,

and the whole well fenced; also convenient sheds and barracks had been built for man and beast, sufficient for shelter from rain and cold, while the hall and other accommodations had not been overlooked, not the least of which in the estimation of your delegate was an abundant supply of running water for the animals,—a very important matter, too often overlooked in the management of our fair grounds. We said "pluck," because the arrangements and changes involved a large outlay of money, contributed by the members of that society and the citizens of Lowell, amounting to about $16,000, and the employment and payment of a great number of workmen to perform the necessary labor for so large an undertaking.

It is not in the province of this paper to report the New England Show. We can only say that if the members of the Middlesex North Society failed to reap any practical knowledge from the mass of material gathered within the limits of their grounds on that September week, it was no fault of the contributors. Every nook and cranny of the exhibition hall were filled with all sorts of products and implements. A large tent was also filled with implements and carriages. Much of the available space at the south end of the park was also occupied in the same manner. The best stock of New England, including (your delegate thought) most of the bipeds of Middlesex, were gathered in the pens and on the benches provided for them, so that the stock breeder and stock fancier of each and every family of cattle, horses, pigs, and poultry could study his particular hobby to his heart's content. And the philosopher and naturalist had ample scope for the study of human nature in varied development, especially in that branch of it that tends towards horse-flesh.

The show was a large undertaking for that society. Its complete success must have been more than gratifying to those having the matter in charge, and needs no further commendation from your delegate.

A. Perry Peck.

WORCESTER.

The fifty-third exhibition of the Worcester Agricultural Society, was held on the society's grounds in Worcester, September 21st and 22d.

The privilege of representing the Board on this occasion, being granted me, I was heartily received as the bearer of my own credentials, by the president and his lady, on the previous evening.

Appearances above the horizon foreboded a storm, but ere the evening passed, the indications were that the morrow would be pleasant.

Being ushered upon the grounds at an early hour by mine host, I could but congratulate the association on their convenient and commodious enclosure, with the accompanying magnificent buildings, suitably arranged for dinner-hall, exhibition-hall, business and private rooms, with a basement for storage and livery. A little past nine o'clock, the appearance of the Worcester band of music, prompted the ploughing match to time, and the way those bright-eyed Devons and Ayrshires right-about-faced, and sped the plough, was a compliment to them and their teamsters; so much so, that I almost coveted the privilege of living near the Worcester fair grounds, that I might have an acre or two ploughed in the time and style in which that was. Sixteen pairs of oxen and four of horses engaged in the match.

There were several very fine herds of Jerseys, Ayrshires and Devons, numbering from ten to thirty head each, with but a small sprinkling of Durhams and one pair of grades from Worcester, said to weigh 6,000 pounds. There were about 275 head in all; There was a creditable, but not large show of sheep and swine; about thirty entries of poultry, with some very fine specimens; and a liberal display of mechanical and agricultural implements with their patents improved.

Master Charles Russell's 207 pound squash from Leicester, the champion marrowfat of New England, claimed attention; it was only a "grade"—what a marvel would such an agriculturist be producing a thoroughbred!

In the hall were a few nice specimens of cheese and butter, such as our Barre friend produces.

The quality of fruits and vegetables was fine; quantity rather meager for this locality. Some fine specimens of household manufactures were exhibited; also specimens of embroidery and flowers, carriage upholstery, &c.

At two o'clock dinner was announced; about three hundred sat down to a bountiful repast, prepared in a style well befitting the occasion. After dinner the audience listened to the address of our friend, Dr. Loring, with that attention and pleasure which is wont to accompany his oratory. With a little filling in of remarks from several gentlemen, and a little manœuvring of horses, the exercises of the first day were closed.

Agreeable to invitation, I accompanied mine host and his lady to the horticultural fair at Mechanics' Hall in the evening. The exhibition of vegetables, fruits and flowers here was abundant, and

exquisitely fine, which accounted for the deficit, if any, at the agricultural hall. The accompaniment of music in the gallery added much to the pleasure of the hour.

The second day being devoted mainly to the noble horse, the exhibition in this line was a grand success. The stallion, the breeder and progeny, the walker, the family and the matched horse, being in succession exhibited.

Dinner at noon, after which the reports of the several committees were presented by the secretary, interspersed with a sprinkling of the poet's musical pen.

At two o'clock the trotting commenced. This portion of the exhibition attracted a large crowd.

Not forgetting to express my thanks to the president and his lady for the cordial and agreeable reception and entertainment I there received, and for the pleasant interview with other officers of the association, I departed with a gratifying margin of enjoyment and profit.

Thos. L. Allis.

WORCESTER WEST.

The annual exhibition of the Worcester West Agricultural Society was held in Barre, September 27th and 28th. It seems almost useless to say that it was a good one; for, situated in the midst of one of the best agricultural regions of Massachusetts, the members of this society have been enabled to keep up the spirit and quality of their exhibitions to a degree hardly equalled. We are all familiar with the zeal with which the best dairy stock has been bred by them, and with the care and intelligence with which they have selected from the breeds best adapted to their purposes. The foundation of their prosperity lies in a well made, thrifty, heavy milking cow, capable of making large returns to the dairy, and valuable for the shambles in the end. And without unreasonable prejudice with regard to any breeds, they have aimed to produce the animal I have described.

The pens of the society were, therefore, filled with an attractive exhibition of dairy stock. And it was a matter of careful study to investigate the principles which had guided each one of the many exhibitors. The conclusion arrived at by Mr. A. H. Holland, the chairman of the committee on Thoroughbred Dairy Cows, for instance, is well worth remembering. He says: — "If a farmer knows that he has a family of good milkers, he should hold on, as every change carries with it uncertainty. Scanty food, harsh treat-

ment, and especially cold barns, have done and will do a thousand times the injury that has been or will be done by in-and-in breeding." For good dairy cows and well-shaped and thrifty working oxen, this exhibition was remarkable. The show of horses also was large and excellent, as well as that of the smaller animals and the poultry. And the collections of crops, fruit, manufactured goods, needle-work and specimens of art were significant of an industrious, thriving, and well educated community.

From the report of the trustees of the society I learn that the society is in a thriving condition. Its financial condition is good. The student whom it has aided in the Agricultural College, Mr. William H. Bowker, "has completed the course of study in that institution, and, as we are informed, in a manner highly creditable to himself." And the trustees conclude their report in terms which can be fully endorsed. They say "they are happy in believing that the operations of the society for the year now past have been successful and as satisfactory as could be reasonably expected. For much of the comfort, enjoyment and success of the exhibitions of the society very much is due to the marshal and his aids, and the committees appointed to award the premiums offered, to whom, for their services, the trustees would extend their most sincere and cordial thanks. In the satisfaction which we may feel for past success, however, let us not forget the duties we owe to the future, but each individual, officer and member, do whatever in him lies to promote the purposes of this society by the advancement of the interests of agriculture and the arts within the limits of Worcester West." Guided by sentiments like these, the society has attained its enviable reputation and performed its useful service.

Geo. B. Loring.

WORCESTER NORTH.

The nineteenth annual exhibition of the Worcester North Agricultural Society was held on their grounds in Fitchburg, Tuesday and Wednesday, September 26th and 27th.

On the first day of the fair we were treated to what we considered an old-fashioned rainy day,—the first one of the kind we had had for several months. Notwithstanding the unpleasantness of the weather, there was a full attendance upon the ground, and the arrangements were executed promply.

The show of blooded stock was large and very fine; and the same may confidently be said of the grade stock, consisting of oxen, steers, cows and heifers.

The show of blooded and grade stock was entirely satisfactory to your delegate.

The show of swine was quite commendable, many good specimens being presented.

The sheep department was not very largely represented.

The feathered tribe was presented in full numbers, and was a prominent feature of the show.

The horse show was very good. On the track were several pairs of good drivers; also some fine-stepping single horses and colts.

The draught-horses performed their work well, showing good training and great power; and I judged the drivers belonged to the Society for the Prevention of Cruelty to Animals, or at least had been under its influence.

The show, in the upper hall, of apples, pears, peaches, grapes, vegetables, bread and butter, was very superior.

The fancy articles and fine arts, from the hands of the ladies, could but call forth the admiration of all. They were arranged ornamentally, and showed superior workmanship.

In the lower hall was a very novel show of various kinds of machinery in operation, power being supplied by an engine at the rear of the hall.

The weather of the second day was bright and beautiful, and from five to six thousand people attended the show.

The chief attraction of the forenoon was a trial of steam fire-engines. In the afternoon the people were entertained with horse-trotting and the balloon ascension.

After dinner the annual address was given by Dr. J. R. Nichols, of Haverhill; subject, "Food of Plants." It was strictly scientific, very interesting, instructive and hopeful.

JOHN JOHNSON, Jr.

WORCESTER NORTH-WEST.

The fifth annual fair of the Worcester North-west Agricultural Society was held at Athol, October 4th and 5th. The weather was all that could be desired, and the collection of people of both sexes, together with the collections from the farmer, mechanic, manufacturer, artist, horticulturist and floriculturist showed the interest that had been taken during the season in their various departments of industry, as each seemed to vie with his neighbor in exhibiting something that would attract attention and add interest to this grand inspection of samples of what had been produced during the

season. The spacious hall was well filled with fruit, vegetables, products of the dairy, manufactures, mechanic arts; also the handiwork of the ladies, both useful and ornamental, all showing the interest that had been taken in the preparation for the show.

I was surprised to see so good a show of apples, as the crop in Massachusetts was so near a failure. There was a large collection and many very fine plates of this valuable and almost indispensable fruit. Although the crop was light and the quality inferior, I trust fruit-growers will not be discouraged, but persevere; forgetting the inferior crops, and remembering only the good ones; for we can ill afford to do without this valuable fruit. Pears were not abundant; but so far as we could judge by the eye, were of good quality. This variety of fruit is becoming more and more plenty, showing, I think, that people do not believe in the saying, that "He who plants pears does it for his heirs." This fruit, although it cannot take the place of apples, can, with a small amount of care, be grown extensively, and become an important part of fruit culture.

Cheese was exhibited from Barre and Petersham factories; also from several private dairies. Butter was also abundant, and of fine quality. I might enumerate many articles, but suffice it to say the show, in this department, was good, doing credit to all those who had striven to make it what it was. I will here mention that the town of Phillipston is deserving of commendation, as more than half the vegetables were from that place. The hall was well arranged,—the basement for storage and cooking, the second floor for exhibition, and the third for dining-hall and for the speaking.

I next visited the grounds, a park of 22 acres, well located and convenient for all the purposes to which it is devoted. The collection of stock was good, especially that of oxen. A large number were on exhibition, showing the pride farmers take in showing their oxen, and also their training for work. Of cows and other stock, there was a fair show.

The second day was devoted to the horse, and many fine animals were brought on to the track, some to show their symmetrical proportions, some their rapid movements, and others both these qualities combined. The number of people in attendance both days was large, showing that they hail with joy the return of their annual fair. A large number of gentlemen and ladies were at the dinner-tables both days, which added much to the social part of the entertainment. The first day was graced by the presence of our worthy Secretary, with others, who entertained, as well as instructed, by their speeches. The second day His Excellency

Governor Claflin was present, and many had the pleasure of listening to his voice.

In closing, let me say that the show was a success, and the officers and others who by their efforts, have brought this society to its present standing in so short a time, are deserving of much credit for their perseverence and efforts, which have been crowned with so much success. We trust they have yet a brighter future.

N. S. Hubbard.

WORCESTER SOUTH-EAST.

The twelfth annual exhibition of the Worcester South-east Agricultural Society, was held at Milford, September 26th and 27th, 1871.

The slight rain on the morning of the first day, which perhaps prevented many from attending the fair, did not in the least dampen the ardor of the zealous and efficient officers and workers of the society, as every necessary arrangement seemed to have been made to render the exhibition successful and interesting. The numerous coops of poultry of the various kinds, loads of swine, and the well-filled stock pens, were evidences of the existence of a lively interest among the farmers of the vicinity in this branch of husbandry.

The little Brittanies and the herd of young Ayrshires, exhibited by the president, Mr. Wm. Knowlton, of Upton, were fine animals. The Ayrshires of Mr. Nathan Walling of Millbury, and the beautiful Devons of Mr. Harvey Dodge of Sutton, were rare specimens of the breeds, and would well satisfy the eye of the most fastidious. There were also some fine Jerseys and valuable grade cattle to increase the interest of the exhibition.

Excellent and well-trained carriage horses were exhibited; also fine young horses, breeding mares and colts, but of that class most useful to farmers, the "farm horse," I am sorry to report the show was quite ordinary.

The most novel and pleasing feature of the track exhibition, and which perhaps drew more attention than any other, was the "subscription purse race," with lady drivers. Though not much inclined to favor horse *racing* as any part of an agricultural exhibition, I think this preferable to the jockeying usually seen at *horse* trots.

The morning of the second day was chiefly occupied in ploughing and in the trial of working oxen and steers. The ploughing, which was mostly done by oxen, both single and double teams, was promptly and well executed.

The working cattle were numerous, of good quality, and well adapted to farm labor. Some beautiful and well-trained steers and steer-calves were exhibited by Bates Brothers, of Mendon. Their intelligent animals were taught to perform a variety of tricks, and the readiness with which they obeyed the voice and harmless switch, was truly interesting.

The collection in the hall was excellent, especially in the department of fruit and vegetables. There was a fair show of agricultural implements, mechanical productions, specimens of needlework, and fancy articles, such as are usually seen on such occasions, and which contribute to make a hall exhibition pleasing and attractive.

At one o'clock a dinner was served in the upper hall to a large number of the members, their families and guests, after which M. F. Dickinson, Esq., of Boston, was introduced, who gave a very able address upon the subject of Agriculture in New England, its progress and its promise, which was listened to with marked interest and attention.

In the closing exercises of the day came the "trot," of which I am unable to speak, as I was not present.

The fair was admirably conducted by the officers and members of the society, who seem to be earnestly laboring to accomplish a good work, and to whom my thanks (as a delegate from this Board) are due, for kind attention, especially to the president, Mr. Wm. Knowlton, whose bountiful hospitality I shared.

A. J. Bucklin.

HAMPSHIRE, FRANKLIN AND HAMPDEN.

On Thursday, the 5th of October, the Hampshire, Franklin and Hampden Agricultural Society opened its fifty-third annual exhibition, at Northampton, with a fine day.

As the herds of cattle came in it soon became apparent that we were to be treated with a fine display of thoroughbred stock. The Jerseys, Shorthorns, Ayrshires,—indeed, through the large herd of thirty-six head from the Agricultural College,—all the principal breeds were represented.

The two counties of Franklin and Hampshire were the chief exhibitors.

Franklin County, through T. M. Stoughton, of Gill, H. H. Haskell and D. O. Fisk, of Shelburne, gave a good show of both Jerseys and Ayrshires. G. P. and W. W. Carpenter contributed a herd of twenty-eight head of Shorthorns and grades.

Hampshire, under such breeders as Milo J. Smith & Son, A. T. Judd, S. A. Bates, and H. S. Porter, not behind its sister county.

Among the best Shorthorns we have seen in the State was a herd of twelve shown by H. S. Porter. S. D. Thorp & Son and L. A. Chase filled out the list for this county with Ayrshires, Jerseys and some grades. Day Brothers also had on exhibition four pairs of fat oxen that gave one at once visions of luscious roast beef. These fine animals showed that we can make beef in New England whose quality would tickle the palate of a New York alderman and add something to his avoirdupois, if not to his honesty. There was also a good number of milch cows on the grounds, with fine points, and some with remarkable records for milk.

The impression gathered from this exhibition by your delegate was, that the counties of Franklin and Hampshire are fully alive to all the improvements of stock, and have already attained such a proficiency in the art of breeding as to present some as fine cattle as are to be found in the Commonwealth.

Though, in this march of progress, the neat stock takes precedence, yet, as shown at this fair, the sheep, swine, poultry and horses are not forgotten.

The ploughing was finely done. The contestants, as they drove on the ground, struck out their own lands, thereby giving at the outset a specimen of the training of their cattle and horses, and their own skill, and presenting a novel feature at these shows.

We found the hall, as usual at this exhibition, a very pleasant sight. The fruits, vegetables, flowers, dairy products, the skill of the artisan, the display of the merchant and manufacturer, together with tempting samples of culinary art, bread, jellies and canned fruits, presented the good things of this life in a profusion which might provoke a smile of gratitude from the most cynical and stir the admiration of the most phlegmatic.

E. H. Judd led off with a large collection of vegetables, but was followed so closely by smaller contributors that the quantity seemed abundant, the quality good, and the culture quite general. Apples of course were very scarce, and yet Northampton and Williamsburg made a fair display. Pears, however, were abundant. Their beauty, variety and quality overshadowed the loss of apples. Grapes abounded. Concords, Delawares, Ionas, Dianas, Adirondacks and Israellas, presented clusters whose luscious beauty would tempt the appetite of the invalid and gratify the taste of an epicure.

The officers of this society, and especially their popular and

efficient secretary, did all in their power to open to us the work they were doing and show us the effects of their labor.

We could not escape the impression that the bounty of the State has here for many years, through this society, been encouraging that healthy competition among farmers, and arousing that interest in their calling, which is apparent in the well cultured farms of this locality, and its good results manifest in the improved stock they exhibit. We believe it will still be an instrumentality to carry forward to completion those improvements in agriculture so necessary to our rapid increase in population and so much to our comfort and the health of our men and women, the noblest products of our somewhat sterile Commonwealth.

Wm. Knowlton.

HAMPSHIRE.

An evening ride of three hours took us from Boston to Palmer, where we arrived at midnight. A short night's rest and we took the early morning train for Amherst that we might attend the cattle show that was to be held on the 26th and 27th of September last. Though dark clouds hung heavy over all, yet the way on either side was ablaze with the glory of the bright autumnal foliage. Here a scarlet maple standing out in bold relief, with its gorgeous crimson, scarlet and gold; the sugar maple, less intense in color, but none the less beautiful; the hornbeam, the brilliant sumach, the scarlet oak, the high-bush blueberry, the woodbine with its matchless color climbing aloft on some evergreen, and peeping out here and there amid the dark foilage of the tree which formed the most appropriate back ground for the beautiful picture that was presented to our view. These were the attractions along the railway, compared with which all other things were unworthy of notice. About nine o'clock we reached glorious old Amherst, with its beautiful hills and valleys, its noble elms and gayly dressed maples, its college buildings, old and new, grandly crowning the hill-top. Beautiful for situation is this goodly town. The cattle show was to be opened at eleven o'clock and the farmers, for miles around, seemed to be on the road for the fair grounds with their cattle, horses, sheep, swine and poultry, or the products of the dairy, garden and orchard. Col. W. S. Clark, the accomplished President of the Agricultural College, who is always in the right place at the right time, was ready to show us what there was to be seen.

The day was not pleasant, having shown signs of rain all the morning; still there was a most excellent show of Shorthorn,

Jersey and other cattle, the Agricultural College alone showing animals of seven different breeds. A. T. Judd had some fine Short-horns, L. A. Chase, Ayrshires and Jerseys that appeared very well. There were several very fine bulls on exhibition. Mr. Cobb of Amherst had Jerseys worthy of mention. The Swiss bull of Mr. Clark, three and a half months old, attracted much attention. The show of cattle of different breeds was good. The town teams were out with full ranks, Pelham leading off with twelve yoke of oxen, Hadley following with eighteen, Belchertown with nine and Amherst with twenty-five yoke,—a goodly sight truly,—and more working oxen than we had seen together for several years. Some fine sheep were shown, including Cotswolds, Southdowns and grades. There were hogs and pigs in good number and of handsome appearance, showing that no little attention is paid to pork raising. There were breeding mares with colts, stallions, farm horses, mules and a valuable Jack, the latter from the farm of the Agricultural College. The second day some of the roadsters were trotted out to win prizes that were offered, but as we were not much interested in this part of the performance we did not attend.

The show of poultry was not extensive, but there were some fine turkeys, ducks and fowls showing a good degree of success on the part of the breeders. The Agricultural College was represented by nine different breeds. Outside the hall was the usual assortment of agricultural implements, with carts, wagons and other articles, all useful to the farmer. The lower hall was filled with a great variety of articles, among which were pears in great variety, our friend Col. Wilder showing no less than one hundred sorts; apples in variety and of good appearance, with other fruits. There was a small show of cheese, but the few specimens appeared well. There were seventeen entries of butter, most of which was of excellent quality, some very superior; many specimens of bread, preserves, &c., that did credit to the good housewives of the neighborhood; a variety of grain, including good wheat; a large quantity and variety of vegetables from various sources; but the best show in this department was from the Agricultural College. There were many beautiful plants on exhibition from the same. Lastly, we noticed a great many specimens of the skill and handiwork of the ladies, many of them useful and ornamental, showing evidence of much patience and industry. On every hand there was abundant proof that the rural people of this section of the State are enterprising and successful in their respective callings.

In the afternoon the rain came down abundantly, and the people flocked into the upper hall in large numbers to listen to the excellent

address of Hon. P. A. Chadbourne on "Utilization of Labor." After the address, a poem was read by Prof. H. W. Parker, of the Agricultural College, followed by remarks by President Clark and the delegate from the State Board. The athletic games on the programme did not take place, because of the inclement state of the weather. The rain continued and the people left for their homes weary with the duties of the day and depressed at the gloomy prospect for the morrow. We enjoyed for the night the kind hospitalities of our esteemed friend, Col. Clark. Contrary to expectation, the morning dawned gloriously; the sky was clear and the sun as it rose over the hills bathed the world in a flood of light and warmth. What a glorious sight was presented from the hill where we stood and gazed! Far off in the distance could be seen Mounts Tom and Holyoke, standing as grim sentinels as though to guard the river passage; villages with their clean white houses, with here and there a church spire, pointing, faith-like, upward; banks of lazy fog lying along the course of the Connecticut, soon to be dissipated by the rays of the rising sun; acres of scarlet oaks and maples with their gorgeous robes of many colors; the buildings of the Agricultural College in the valley at our very feet,—all helping to form a picture that will not soon fade from our memory. We visited the College, the farm and greenhouse connected therewith, and though our visit was a hasty one we were well pleased with what we saw. There were some acres of sugar beets being cultivated for the purpose of testing their value for sugar making. We noticed a marked improvement all about the farm since our former visit. On our way to the farm we saw a scarlet maple standing by itself that was one of the finest sights of the kind we ever beheld; nothing could exceed it for brilliancy and beauty; the foliage of the main body of the tree was still green, while all the outer branches were gorgeously colored, growing brighter and brighter to their very tips. Would that those who see little to admire in nature, could have been with us and looked as we did upon this tree with all its wealth and profusion of beauty.

The forenoon at the fair grounds was principally devoted to the games of which we have before spoken, affording much enjoyment to the large numbers assembled. These games were followed by the exhibition of horses on the track, which we are told was quite successful. We left our Hampshire County friends with the feeling that they are doing well and that it is a good thing to be with them once in a while.

James F. C. Hyde.

HIGHLAND.

The Highland Agricultural Society held its sixteenth annual exhibition at Middlefield, on the 14th and 15th days of September.

After a pleasant drive of some three or four miles over a mountainous and beautifully picturesque region, your delegate arrived at the grounds of the society early in the forenoon of the first day, where the enterprising farmers, with their fine animals in great numbers, had already assembled.

I have rarely, if ever before, seen so high an average standard of neat stock gathered in one place, consisting of the purebred Shorthorn, Devon and Jersey, with their grades, including some strongly-marked strains of the Hereford and some of the Ayrshire breeds. Some of the oxen were estimated to weigh 4,000 pounds per yoke, and of the steers, three and four years old, 3,000 to 3,600 pounds. One and two-year-old steers and heifers were proportionally large and fine, indicating skilful breeding, as well as generous feeding.

The display of bulls was not large, but their merits were of a high order. One thoroughbred Shorthorn, Duke of Clarence, three years old, and estimated to weigh 2,300 pounds, was a model of symmetry. Several yearlings of great promise, sired by this bull, were exhibited. The three-year-old Shorthorn bull, Mountaineer, is an animal of great merit. A bullcalf, five months old, sired by Duke of Clarence, weight 565 pounds, is an animal of great promise. One Devon bull, twenty-one months old, weighing 1,040 pounds, for beauty and finish would be hard to beat.

Triplet steers were exhibited in one yoke, and twins in another; all fine animals, and attracted much attention.

The show of cows and heifers was good, and highly creditable to the exhibitors.

Several flocks of fine, medium and coarse-woolled sheep of good points and fair condition were on exhibition.

Swine and poultry were not largely represented.

Some specimens of agricultural implements, of good finish and appearance, were shown.

The products of the dairy were not large but appeared well.

The exhibition in the hall of samples of grain, fruit, vegetables, etc., was creditable.

An evidence of the coöperation, good taste and skill of the ladies of the society was seen in articles exhibited by them.

In the evening a large audience assembled in the hall to listen to brief addresses, and vocal and instrumental music.

The show of horses on the second day was good. Several finely matched teams, and single horses, in harness, showed good action and discipline on the track, and several noble colts gave promise of future usefulness.

A good dinner was served on each day of the fair, in an L attached to the society's hall.

On the afternoon of the second day an address by Professor Tatlock, of Pittsfield, was followed by music, the reading of the names of successful competitors, and the payment of prizes.

Much credit is due the officers of the society for the order, promptness and dispatch with which all the departments of the fair were conducted; and your delegate is under special obligations to them, and to other members of the society, for courtesies and hospitalities.

HERMAN VINCENT.

HAMPDEN.

The delegate assigned to the Hampden Fair, at Springfield, being sick, was not able to attend; therefore, in compliance with the request of the officers of that society, I offer the following report:—

The fair at Springfield opened on the 7th of October, a mild and pleasant morn, in which the society demonstrated their capability of making a creditable show of cattle, both thoroughbred and grade, which, however, belonged mainly to a dozen individuals, shadowing forth the inference that there was not that general response in this line that would serve to encourage the old veterans.

There were three town teams, from twelve to twenty-five pairs each; West Springfield carrying off the premium therefor.

The Devons made a marked display among the herds, with some fine exhibits of Durhams and Ayrshires.

A meagre show of sheep and swine.

Show of poultry creditable, though not large, with an offering of thirty-one Longmeadow white turkeys at the head.

There was quite an extensive display of agricultural implements of the best improved patterns.

The address, by General H. K. Oliver, was delivered on the stand, at 2 o'clock P. M., and was listened to by some 200 or 300 persons, amid frequent applause. At the close of the address a gentle rain set in, which ended the proceedings on the grounds for the day.

The exhibition in City Hall seemed rather lean, considering the

profuseness of the growth of vegetables and fruits; also the extent of manufactured articles in this vicinity.

Your reporter would suggest to this society, as well as to others, the advantage a good hall upon their show grounds would be to their exhibitions; also the lessening of the area of their show grounds very materially, which, I believe, is now under contemplation.

Three or four fine specimens of butter, by the president's lady and others.

Friend B., of Blandford, was not disturbed with any cheese competition.

A very good display of pears, and of some kind of vegetables, was present.

Wednesday being designated as the horse show day, for the chilly breeze, or some other cause, a very thin assembly was on the ground at the appointed hour, but the numbers gradually increased, culminating in a very creditable exhibition. From 2.40 down to the teamster's gait, weight from 1,700 down to 400 pounds,—these two extremes being the walking entries,—West Springfield carrying off the first prize, with its twenty-seven turnouts. A lady driving a pair of four-year-olds, said to be broken by her, while her promised protector succeeded in managing a pair of team horses: who says this is not an omen of the future? A young miss did some pretty smart driving, with the result of one slight accident.

At the dinner hour, a procession, being headed by the Armory band, took up their line of march for the Massasoit; arriving, the company, with reinforcements, charged upon one of those reputable Massasoit dinners with agricultural energy and decorum.

Physical man, with a small sprinkling of ladies, being comforted, President Stedman congratulated the society on their general success on this occasion, and called upon General Oliver, who responded in his usual genial manner, after which, a few remarks from one or two other individuals closed the literary entertainment.

Returning to the Park, the premiums were announced, and the summing up of the twenty-seventh agricultural fair at Springfield was one of the best, if not the best, show of stock ever exhibited there. The officers and veterans of this society are evidently rowing hard for success. May it be granted to their indomitable energy.

Your reporter would beg leave to thank the president and his associate officers for the agreeable social and physical entertainment received at their hands. T. L. Allis.

HAMPDEN EAST.

The nineteenth annual cattle show and fair of the Hampden East Agricultural Society was held at Palmer, October 10th and 11th, 1871, at which we were present as a delegate from this Board.

On arriving at the grounds we reported ourself as delegate to the society from this Board, but to our surprise we were informed by the keeper at the gate, that he knew nothing of us, and having no pass we tendered our quarter and passed in. Having gained admission we proceeded to make examinations.

We found a large exhibition of stock on the grounds. Among the thoroughbreds were Durhams, Devons, Ayrshires and Jerseys. We particularly noticed among the herds exhibited, twenty Shorthorns, by O. M. Graves, of Monson. H. M. Sessions had on exhibition some nice Devons; Alvin Hastings, a herd of eighteen milch cows, that exhibited remarkable properties as milkers.

So far as we can judge, we should say that the show was as good, if not superior, to what it has been in former years.

In the afternoon there was an address by Professor Stockbridge, from the Agricultural College, subject, "Forest Trees," which was listened to by a large concourse of people, whom, we trust, were benefited thereby.

There were but few entries of sheep, and those not of a superior quality.

Of poultry the number was small, but the quality, we should think, fair.

In swine the entries were few; the quality, we think, very good.

The fair was held in the vestry of an adjacent church. On arriving at the door, thinking of our success at the ground in gaining admission, we tendered fifteen cents to the doorkeeper, and were admitted without further question.

In the hall the exhibition of fruit was very good for the season. Vegetables and the grains were well represented.

Butter and cheese were there in abundance, and judging from looks, the quality must have been excellent.

In fancy articles the ladies had done their part well, as they always do.

Domestic manufactures were fully represented there, and appeared well.

On the morning of the 11th it rained, in consequence of which it was expected the exhibition of horses would be postponed, and we took the first train for home. We have since learned from one

who was present, that the exhibition of horses was unusually good, being larger in numbers and better in quality than heretofore.

NAHUM P. BROWN.

UNION.

As delegate from this Board I attended the exhibition of the Union Agricultural Society, held at Blandford, Sept. 19 and 20. Arriving at the Russell station on the morning of the first day, we found a gentleman waiting to take us to the fair ground. Leaving the depot we at once commenced our somewhat tedious though interesting ascent through an elevated country. Often we passed and then repassed the rocky bed of what is evidently at times a rapid torrent. Anon we neared the verge of a deep ravine, seemingly so near that a slight accident might turn us down, down helpless for hundreds of feet. Moving on between, around and over the hills piled up before us, at the end of an hour's ride we found ourselves on the grounds of the society, evidently on the crest of the Old Bay State.

We were soon made aware of our increased altitude by the change of climate which a few hours' ride had wrought, reminding us of our verdancy in leaving home without better preparation. Still the weather, though cool and bracing, was all that could be desired for a successful farmers' festival.

Inquiring for our friend, E. W. Boise, we found he was not unknown in that community; for in reply we were told that Mr. B. and his father owned nearly half of the town of Blandford.

The grounds of the society contain eleven acres, inclosed by a good fence, and command a view of Western Massachusetts as well as portions of New York and Vermont,—a panoramic scene, extensive, varied, beautiful.

One of the first objects that attracted our attention was the fine building recently erected by the society, two stories high,—the first floor being used as a dining room and kitchen, and the upper for its exhibitions.

The forenoon was occupied in arranging the various articles and animals for exhibition. At noon, dinner was served, and we queried how the society could furnish so good a repast at so small a price.

We availed ourself of the afternoon to make such examination as we were able, of the different departments of the exhibition.

First in order of excellence and extent was the collection of stock. And here it was evident that the Union Society believe in

purity of breeds, as the earnestness with which the owners of different classes traced back the pedigree of their animals showed their interest in the purity of their blood. There were sires as well as dams of the Alderney, Ayrshire, Devon and Durham breeds. The exhibition in this department was pronounced by experts very good. The working oxen were fine animals and performed their work well; but we thought, in a few instances, the tests too severe.

The display in the hall was very creditable, especially in the Home Department. We have seen larger collections, but none of superior excellence. This was true not only of the skilfully and curiously wrought embroidery—the flowers and fruits in water colors, so perfect in representation we might easily imagine a perception of their fragrance and aroma—but also the more substantial productions of home-made carpets, quilts, rugs and mittens.

The collection of fruits was limited, but the specimens were good. The evening was spent very pleasantly in the church, in listening to pithy addresses, interspersed with vocal music. The last day was devoted to the exhibition of the horse. This noble and useful animal always awakens admiration. Whilst we revere his attributes and instincts we should deprecate their all-too-frequent abuse. We are happy to say that this criticism does not apply to the Union Society.

The fair closed with an address by Dr. E. W. Hatch, of Meriden, Conn. The address was a model production, full of practical suggestions and useful hints.

This society does not appear to require the inspiration of martial music and other outside appliances that are demanded in many localities to please the crowd, but are satisfied with the ordinary attractions of an old-fashioned cattle show.

To the officers of the society, and especially to its worthy representative to this Board, we are under special obligations for their courtesy and kind attentions.

Geo. M. Baker.

FRANKLIN.

The reports of former delegates to the Franklin County Agricultural Society, have represented it as in a prosperous condition, and doing a good and legitimate work in encouraging the various departments of agriculture, in collecting and disseminating information on agricultural topics, and making that information of practical utility. By its exhibition of 1871, it has fully sustained

that reputation. That the society is prosperous is known first, by the fact that it has nearly two thousand life-members actively interested in promoting the objects of its organization; and second, it has no debts, but an available property of $9,000, an income of more than $2,000, and annually distributes in premiums about $1,500. The exhibition gave clear indications of a lively and intelligent interest, in every department of agriculture, manufactures and the mechanic arts, and of an honorable strife for excellence in each. It would be impossible to speak in detail, or as its merits deserve, of each department of the exhibition. Everything seemed to have its appropriate place and due attention: there was nothing superfluous, and nothing forgotten which is needed to make an exhibit of the industry and intelligence of a community. The first marked feature of the fair, was the very large attendance of all classes of the people, the large number who were exhibitors, and the universal appearance of earnest interest in the real objects of the occasion. It was not a "got up" thing, a mere show. There was little manifestation of a disposition to simply have a "jolly good time"; but while life, animation and the most cheerful spirit everywhere prevailed, there was a deep, hearty business air pervading all, which indicated a purpose to make the exhibition a means of individual advantage, by gathering information for home application. Without a deficiency in any department, the meeting was *par excellence* a cattle show. There were 296 entries of neat stock, embracing many hundreds of animals, and if possible the quality was more praiseworthy than the number. From one town (Deerfield) there was a string of 33 pairs of oxen, whose average weight was 4,068 pounds a pair. Specimens of pure-bred Shorthorns, Ayrshires, Jerseys, Devons, Herefords, and Kerrys were on exhibition. In every division of this department, in beef, milk and labor stock, a critical examination showed the result of intelligent skill and persistent effort to accomplish some definite object. I think it would be impossible any where else in this State, to collect from an equal contiguous territory, a finer show than "Little Franklin" made on this occasion of the common herds of their farms, or of well-bred specimens of the different breeds. The cattle are there, and most of them have been bred there, not as the result of chance, but the product of deliberate thought and labor, extending through many years. If it be true that animals are made up from the soil on which they feed, the foundation of this successful stock production has been laid by the improvement or the retention of its natural fertility, and care in the growth of crops of sweet, nutritious grass and hay. Nature has done something to aid the

farmers of Franklin in their work, but little more, however, than it is ready to do for all others who will use it as kindly and intelligently. Agriculture within the limits of this society is unmistakably progressive, and the State bounty which it annually distributes is being judiciously used to further the good work.

Having thus written what the honest truth requires in relation to the work of this society, I may be permitted to suggest, that its present condition as to means and intelligence is such, that its influence for good should be extended beyond county limits. The light and knowledge which has exerted such a benign influence on all their handiwork, in one sense belongs to the State. In various forms it should be embodied in their published Transactions and become public property. But such is not the fact. The committee on ploughing was the only one which made a written report, and that was little more than a statement of the fact that such and such ploughs were awarded the premiums. No attempt was made to describe the peculiar merits of different implements, the principles on which they were constructed, to explain the objects to be attained by ploughing, or whether the ploughs on the ground were capable of accomplishing that object, and if not, in what their deficiency consisted. Now the intelligent gentleman who wrote that report is a most skilful ploughman, thoroughly understands the object of ploughing, and the difference between a good and poor plough, and for the good of those who do not know, he should have embodied a part of that knowledge in his report. So, too, in other departments, the gentlemen who acted as chairmen of the examining committees were themselves adepts in the production of the articles or stock they examined, and yet not one of them seem fit to communicate to the public in a report, the result of his experiments or the information which has made them so successful.

Among the members of this society, are many gentlemen of intelligence, of large experience, whose efforts in improving the soil and their herds of cattle have been eminently successful,—gentlemen who are good thinkers and clear writers; but the society's Transactions are not a medium of conveying their knowledge to other agriculturists of the State. It is to be hoped, that, in the future, the officers of this society will introduce some system by which the intelligence and skill that has produced such marked results there may be more widely disseminated.

LEVI STOCKBRIDGE.

DEERFIELD VALLEY.

The first annual exhibition of the Deerfield Valley Agricultural Society was held at Charlemont, October 10th and 11th.

The society was chartered at the last session of the legislature, and entered upon its work with little previous training, except what it had secured in a less imposing manner as an unincorporated body. The grounds selected are a commanding elevation adjoining the village of Charlemont, and they are admirably adapted to the service to which they have been assigned and dedicated. They have been admirably laid out, and furnish excellent accommodations for the fair.

The interest manifested in the exhibition was great, the farmers of the Deerfield Valley having contributed liberally to the show, and a large concourse of people having gathered to witness it. As an indication of the desire they felt for its prosperity, a long list of patrons, who had subscribed from one dollar to fifty, had been placed in the hands of the officers.

The collection of cattle was large and valuable, consisting of town teams from Hawley, Buckland and Charlemont; a good number of yokes of oxen of various ages, belonging to single exhibitors; and fine specimens of well-bred and well-selected cows and heifers. So good a reputation do the cattle of this section enjoy, that I found some of the best judges in the State on the ground making selections for their own use.

Liberal premiums having been offered for sheep and swine, a good exhibition of those animals had been secured, and a valuable and serviceable collection of horses competed in the various classes for premiums. The products of the dairy, the orchard and the garden and field quite surpassed my expectations; and I have seen nowhere finer specimens of the handiwork of the farmers' wives and daughters.

A numerous, attentive, orderly and patient audience gathered on the afternoon of the first day, covering a beautiful slope, devoted to the services of the occasion, to listen to an address on the character and the opportunities of American farming. It was evident that a spirit of inquiry and investigation animated the members of the society and their friends.

The association has commenced under the happiest auspices, has been organized with great care and skill, and is well deserving the bounty of the Commonwealth. It promises great usefulness to the section of the State which it occupies. GEO. B. LORING.

BERKSHIRE.

On the morning of the 3d of October I went to Pittsfield to attend the sixty-second annual exhibition of the Berkshire Agricultural Society, which was holden on their grounds in Pittsfield, on the 3d, 4th and 5th of October.

I was cordially greeted on my arrival by John E. Merrill, Henry M. Peirson and William H. Murray, Esquires, president, treasurer and secretary of this ancient and much-honored Agricultural Society, dating back, as its does, prior to the war of 1812.

Being unable to remain with the society during the three days of its exhibition, I will speak in brief of what most attracted my attention as I passed over the grounds and through the hall.

In the stock department there was a large display of Durhams, Ayrshires, Jerseys, Devons and Dutch cattle, with more or less of natives or mixed breeds. There was a large number of Durham and grade oxen, which attracted much attention, as they were exhibited by their drivers in the ancient manner, nearly every driver holding in his hand a stick, from ten to twenty feet long, with a small lash upon the end, which each had seemed to be fortunate enough to find in the forest; making but little difference how far apart oxen and driver might be, he was easily enabled to guide them.

The Durhams exhibited by J. H. Crook & Son were of superior quality, and deserve special mention.

The exhibition of sheep was more than an average one.

The show of swine was not large, but fair in quality.

In the poultry department there was quite a variety, though not so large in numbers. From the exhibition of swine and poultry, it was manifest that the society embraced among its members those who were skilled in these branches of husbandry.

The exhibition of horses was very good, some of which challenged the admiration of the beholder.

The exhibition of agricultural implements was small, though the farmers of Berkshire, doubtless, appreciate the value of labor-saving machines.

There was a fine collection of fruits and vegetables. A fine and large collection of grapes was shown by Mrs. William Pollock. The specimens of apples and pears were very fine for the season.

The display of household manufactures was very extensive, and evinced great skill and taste on the part of the ladies, and showed

that they looked to the ways of the household, in regard both to ornament and use.

Feeling my inability to do justice to the display of butter and cheese, I will content myself with saying that it surpassed, both in quantity and quality, anything that I have ever beheld at an exhibition of this kind, and, with the bread on exhibition, which reflected great credit on the wives and daughters of the farmers, was more than sufficient to feed a multitude.

I can heartily congratulate the Society on its prosperous condition, financially and otherwise.

In passing around I was forcibly reminded that the members of the time-honored old Berkshire Agricultural Society had been at work during the past season trying to see what they could produce, and had brought together for exhibition the results of their labors, which said, "See what I have done"; all of which was worthy of commendation, and spoke volumes in favor of the industry and skill of the farmers of Berkshire.

I regret being unable to speak of the excellent address of the Hon. Thomas Allen, which is, however, reported at length in the Transactions of the Society. J. Ladd.

HOOSAC VALLEY.

The Hoosac Valley Fair was held at North Adams, on the 19th, 20th and 21st of September. Though it was late on the afternoon of the first day when I arrived, yet I had an opportunity to see the most of the stock before it was removed from the grounds. The day was cool, the sky was overcast, and a damp north-east wind, sufficient to cool the ardor of any but a community of Berkshire farmers, prevailed throughout the day. But regardless of the weather, the attendance was large, much better than we had expected to see, and the exhibition, in nearly every department, we were told, surpassed that of former years.

The show of neat stock embraced excellent specimens of Durhams, Ayrshires and Alderneys. A three-year-old Durham bull, weighing 1,660 pounds, belonging to Mr. W. S. Ford of Williamstown, was nearly a perfect type of that breed.

I was told that there had been a good exhibition of sheep during the day, but regret to say that many of the pens were empty when we got round to them; yet we found some very nice bucks, both of the fine and coarse wool varieties. Mr. John Leonard Cole of Wil-

liamstown, late member of this Board, exhibited a Cotswold buck and ewe, which attracted universal attention.

We saw no swine, but were told that the show was not large, but the quality was good.

The show of poultry was very large, said to have been the best ever made in Berkshire County. Coops containing nearly every variety of the improved breeds were constantly surrounded by an eager, admiring crowd.

The hall of the society is not large, but is well adapted to the purposes of an exhibition. Every table, shelf, nook or corner was filled with some object of real interest.

The show of vegetables and fruits, with the exception of apples, was extensive, and the quality would lead one to suppose that these were all grown to order expressly for the occasion.

North Adams and the surrounding towns added greatly to the exhibition, by showing products of their varied industries, which for style and finish would be hard to beat.

The floral department was simply superb. A richer display of flowers we rarely ever witnessed, and the capacity to appreciate the beautiful was quite apparent in the multitude, who were so loth to leave the tables. We noticed two miniature structures, one called the "Floral Temple," and another "Flora's Cottage," made principally of evergreens, moss, flowers and leaves, which were not only models of skill and ingenuity, but displayed in their structure a refined and cultivated taste. These alone should have commanded an entrance fee to the hall.

Outside and around the hall were displayed a good variety of agricultural implements, among which were to be found a sample of every mowing machine now in use.

The fair was characterized by good order, good taste, and a gentlemanly deportment, manifested not only among the officers and committees, but by the large promiscuous crowd who evidently regarded the occasion as one instituted with special reference to a good time generally.

A. P. Slade.

HOUSATONIC.

The annual exhibition of the Housatonic Society was held at Great Barrington, Sept. 27th, 28th, 29th, 1871.

The exhibition was good in every branch. The most prominent feature was the summer and fall crops of all descriptions. Grain of all kinds that are usually raised in New England, wheat, rye and

oats, seemed to be the most numerous, yet there was a large show of all kinds of grain and grass seeds; the number of entries I have not before me; they were many.

The fall crops consisted of corn, buckwheat, potatoes, beans, turnips, squashes, mammoth and smaller kinds, cabbages that looked as though they were raised by men that knew how. The entries were many and all of a rather superior quality; they were all worthy of praise.

The products of the dairy were well represented. I saw fifty-four samples of butter, which were of fine quality, and gave assurance that the farmers wives in Berkshire have lost none of their skill in butter making, which is a very important item in making the farm pay.

Of cheeses there were fourteen, with one sage and one factory, making sixteen in the whole. I was told that the farmers'-made-cheese sold at home better than factory, at a higher price and much better profit, which is worthy of notice by all who keep dairies, and the example set by this society is worthy of much praise.

The exhibition in the hall, of fruits, flowers, domestic manufacture and articles of taste was admirable and extensive. The show of cattle was not large. I saw one good pair of fat oxen, some three or four pairs of working oxen, a few small herds of cattle with some eighteen or twenty milch cows; they were all of the finest stock, and oxen and cows such as a man of fancy would like to look at. For bulls which showed good of the Shorthorn and Jersey, Mr. Hubbard of Barrington presented a three-years-old Shorthorn that in my opinion cannot be beaten, especially in shape. Also a Jersey, owned by Mr. Curtis, was worthy of notice; others, some eight or ten, of good blood and good appearance.

A goodly number of horses were on the ground, well trained and of good appearance. The horses of both sexes showed that farmers in the Housatonic Society understand the kind of horses that are worth raising.

The ploughing was done with horses, by nine competitors. The ploughing was handsomely done. I should say for my farm the most of it was too shallow; I should think the most of it was not over 5½ inches to 6½ inches deep; to show good ploughing I should say from 7 to 8 inches would be needed, which would require much more skill than the shallow depth of 5 or 6 inches, and would stand the drought better.

The course observed by this society in regard to pedigrees of stock is worthy of praise, and should be observed throughout the Commonwealth.

The exercises in the hall consisted mainly of an address, showing the duty of farmers to influence their sons to stay at home on the farms, and that New England was as good a place to live or die in as any part of the United States.

With the award of premiums, &c., and with foot-races, and music by the Bridgeport city brass band, the show ended.

H. Converse.

NORFOLK.

The twenty-third annual exhibition of the Norfolk Agricultural Society took place at Readville, on Thursday and Friday, Sept. 21st and 22d, 1871.

The first day of the exhibition was devoted to the display of the cattle, swine, ploughing match and various articles of manufacture, etc.

The stock exhibition was very small. Less than twenty head of cattle were on exhibition in the pens on the first day. There were only a few pairs of working oxen. I noticed one herd of Jersey cows, which was very fine.

There were no sheep upon the grounds. The display of swine was not very large, but was highly creditable.

The ploughing match both of oxen and of horses was the most interesting portion of the first day's exercises. The teams showed evidence of good training, and the holders of the ploughs were clearly masters of their profession.

The exhibition of fowls was exceedingly large, and embraced a large variety of the different specimens of poultry.

The display of fruit was very creditable, as was also that of flowers, eminently so. In fact the hall exhibition of domestic manufactures, vegetables, &c., was very much beyond my anticipation, and very much credit is due those who had the charge of the several halls, for the taste they displayed in their arrangement. I doubt very much whether any society in the State has more commodious halls for the exhibition of their several kinds of manufacture, &c., than this society has.

The second day's exercises consisted of the society's dinner, an address from Samuel B. Noyes, Esq., of Canton, and the usual trial of speed of horses.

The display of horses was quite large, and some very fine animals were on exhibition. I did not witness very many of the trials of speed, but learn that they were highly creditable.

The exercises at the dinner table were exceedingly interesting. Brief addresses were made by Hon. Marshall P. Wilder, who officiated as president, on account of the unavoidable absence of the president of the Society, and Hon. F. A. Sawyer, U. S. senator from South Carolina.

The poem delivered by Eugene Batchelder, Esq., of Dover, was well received.

The address of the orator of the day, who took for his theme "Nothing New," was full of life and thought, and held the close attention of the audience for nearly an hour.

I can hardly refrain from expressing my deep regret, that while so much interest is apparently taken by the members of this society in the exhibition of their several articles of produce, manufactures and horses, so little interest is manifested in exhibiting their cattle. I learned that one substantial farmer near the grounds, did make an effort to drive in his large herd on the second day, but I did not happen to see it. When I arrived upon the society's grounds on the first day, and saw the empty condition of the cattle pens, I naturally began to inquire why it was,—whether there were no good cattle within the limits of the society. And I ascertained that a large number of splendid cattle were located on the farms and in the barns within sight of where we then stood. "Why, then, are they not here?" said I. "Well, the farmers think it won't pay," was the reply. Not pay! Can it be possible that any intelligent farmer in Massachusetts can honestly come to the conclusion, that once a year it will not pay for him to meet his neighbors with his stock of cattle and compare their respective merits, and by so doing become richer? If not richer pecuniarily, richer in wisdom and knowledge, which is far better.

It does seem that no member of an agricultural society who has the best interests of the cause at heart, will refrain from a cheerful contribution of his stock to their annual exhibition, merely on the assumption that "it does not pay."

I cannot excuse myself without herein expressing my heartfelt thanks to my friend, Col. Eliphalet Stone, of Dedham, and his wife, for the very kind and generous hospitality they tendered me on that occasion.

F. F. Fay.

HINGHAM.

Your delegate being unable to be present at the exhibition of the Hingham Agricultural and Horticultural Society, has been furnished

by the secretary with the principal facts on which the following report is based.

The thirteenth annual exhibition of the Hingham Agricultural and Horticultural Society took place on Tuesday and Wednesday, September 26th and 27th. Both days were pleasant; indeed, finer weather could hardly have been desired for the occasion.

On the grounds, the pens for cattle, sheep, swine and poultry were not only creditably filled in numbers, but included animals of the highest degree of purity and excellence.

Thirty-six milch cows were entered for premiums. Among these were several fine grades; but the attractive features of this department were found in the beauty and purity of the Jerseys, Ayrshires and Devons. The Jerseys — among which were several imported specimens from the herd of the president of the society — were noticeably handsome, pure-blooded animals. The calves and heifers on exhibition numbered seventy-seven, and included pure-blood Jerseys and Ayrshires, as well as many promising grades.

The number of sheep on exhibition was 146, 145 of which were from the town of Hingham. In this collection were full-blooded Leicesters, Oxford Downs, Cotswolds and South Downs. The flocks of the last named, from the farms of David Whiton and John R. Brewer, were considered among the best ever exhibited before the society.

Of swine of all kinds the pens contained in the aggregate 133, embracing Suffolks, White Chesters, Yorkshires, Columbia County and Neapolitan, with crosses of these different breeds. The largest specimen was from the farm of the president of the society, and weighed 720 pounds. The show was considered by the members of the committees, who had repeatedly served in the same capacity, and by visitors generally, as being superior in numbers, size and quality, to any made for several years.

At the trial of working oxen, which took place on Wednesday, eleven yokes competed for the prizes offered by the society. The occasion attracted a large number of persons, and the entire absence of severity on the part of the drivers, was a feature of the trial generally noticed and commended.

Of horses and colts there were thirty-two entries; and matched and family horses secured a large proportion of the society's prizes. Two colts,—one half Morrill, and the other a Patten grey, each two years old,—from Washington Brown, of Cohasset, were model animals.

The town team was made up of forty-nine pairs of large, hand some oxen, six pairs of which were from the farm of the president

of the society. All were in fine condition; many were really premium beeves, and as they passed in review around the track, there appeared to be no instance where the results of kind treatment and generous fare were not observable.

The show of poultry was good, and under the improved facilities provided by the society for exhibitors, the department never appeared to better advantage.

In the hall the noticeable features were the displays of pears, grapes, flowers and garden vegetables. Of pears there were 362 plates exhibited, and there were 175 plates of grapes. In the collection of grapes, there was not only a large number of really valuable new varieties, but throughout the whole display a degree of maturity prevailed never before seen on the tables of the society.

With the different productions of the farm and garden, there were displayed in the hall various kinds of works of art, skill and industry, and in connection, numerous modern and improved machines and implements of husbandry.

Spading, ploughing, trial of draft horses, rural sports, etc., interspersed through each day, gave variety and interest to the outdoor attractions, and were witnessed by a large collection of persons. To this part of the programme was added a trial of chemical fire engines. Two rough buildings, about ten feet square, and eight or ten feet in height, were erected on the easterly side of the grounds, and filled with straw, pitch and other highly combustible materials. The Hingham Cordage Company and the Hingham Jute and Bagging Company each furnished an engine for the occasion, with a sufficient number of men to work the same. After being ignited, the buildings were undisturbed until well on fire. The labor of a few moments was sufficient to check the progress of the flames, and the whole was soon completely quenched, leaving most of the structures yet standing.

The annual dinner of the society came off on Wednesday, and was shared by nearly 500 members and guests. Colonel Hawkes Fearing officiated as chief marshal. On the platform were Hon. Albert Fearing, the president of the society; vice president, Hon. Solomon Lincoln, Hon. Stephen Salisbury, of Worcester; Hon. George S. Hillard, of Boston; Hon. Henry W. Paine, of Boston; Rev. E. Porter Dyer, of Shrewsbury; and others. At the right of the president were seated the following venerable persons, viz.: Mr. Timothy Dodd, of Boston, still in active business in Boston, aged ninety-one years; Mr. John Souther, now of Boston, but a native of Hingham, aged ninety years; and Mr. Benjamin Hobart, of Abington, whose ancestors were of Hingham, eighty-nine years.

These three aged gentlemen have seldom failed to be present at the annual fairs of the Hingham Agricultural and Horticultural Society, and their health and mental faculties are yet unimpaired. It should perhaps be added, that since the gathering, Mr. Hobart has attained his ninetieth year. JOHN B. MOORE.

BRISTOL.

By some unfortunate calculation,—the reverse of the astronomers, who are always figuring a derangement of the machinery of the heavens, and a consequent collision of a wandering comet with the sun or his unworthy satellite, our earth,—our political managers contrived to bring into conjunction the convention, which was to decide whether Massachusetts could be lassoed and corralled, or really was free to roam the plains and choose her own rider, and the gatherings of our fairs last autumn; and many of us had to apportion the time as best we could between the primary duty of attending to the State, and the secondary one of attending to her eldest progeny, Agriculture. Consequently your delegate to Taunton had but one day there,—the last, and evidently not the best,—the pens showing an aching void of stock, and the few gallinaceous remnants giving vent on his arrival to quite uncertain and adumbrated resonances, denoting too long exposure to the night air, and incomplete filling of the gastric regions. In fact the fair grounds would have presented to a mind conversant with the principles of geology, a correlative of one of those epochs in which are found at its close one or more representative types of all the animals and plants which had existed in profusion before its decline, but it would have required the abilities of a Cuvier or an Agassiz, and much more time than was allowed your delegate, to have restored, even in imagination, the denizens of the cattle pens, and the horse-sheds, from a study of the types before him, and he was fain to take the word of the delegate from the Bristol Society, and gather from the report of the committee, that all was as it should be in regard to the exhibition of animals, the attendance of visitors, and the other ordinary concomitants of an agricultural exhibition; and from what your delegate could learn by inquiry, this forty-eighth annual fair of this respectably aged society, was among its best, especially in its exhibitions of working cattle and horses, thoroughbred animals and sheep, fat cattle and display of poultry, and swine; the State Lunatic Asylum competing in most of these

classes freely with individuals; and Shorthorns, Ayrshires and Jerseys, handsome horses and colts, American Merino sheep, swine and their varieties, including a Poland China boar and sow, and a Madagascar boar, Berkshires and Chesters; and fowls, from the Houdans, Crevecœurs, Brahmas, to the common barnyard, contributing to give variety and interest to the exhibition.

Your delegate was glad to learn that the ploughing matches with ox teams and horses, and the drawing matches and trials of working horses were numerous and well attended, though for that matter, anything connected with a match, from a wedding, horse trot, trial of skill, to noisy lucifers, has a tendency to attract American citizens of larger as well as smaller growth. Yet these ploughing matches seem to be of peculiar interest in the more eastern societies of the State, and in several, supersede the supposed necessity of permanent tracks for trials of horses' speed, giving them for that reason extraordinary value to the true agriculturist. Yet judging from the expensive character of the track of the Bristol County fair, the amount of money annually expended upon it, the liberal awards for speed, the full attendance at the last day, the horse cuts no diminutive figure in its programme, and if racing is not the principal attraction, it is not one of the minor ones. But we are indisposed to be too critical upon this point, even in a severely agricultural view. Leaving out of consideration the claims of breeders of horses in remote parts of the State, the attractions of a fair must, to a great extent, be arranged according to the position of the exhibition, and in the vicinity of large towns or manufacturing centres, it may be most expedient to give a liberal encouragement to trials of the horse's speed, trusting that those who would not otherwise come to the fair, may, when inside, be led to the study of something more ennobling, and at any rate be able there to gratify decently an appetite for their favorite pastime, without pursuing it in places where vices and vicious persons most do congregate.

> "A primrose by a river's brim,
> A yellow primrose is"—to most folks,
> "And nothing more."

And it is impossible to implant into every mind, and especially into the untutored, tired minds of the daily workers for bread,—the ten-hour toilers,—a taste for merely agricultural or mechanical shows, and they need the stimulus of some pleasant excitement; and the exhibition of horses' speed to them, after the work of the rest of the week, is equivalent to the light literature of the jaded student, or

the drive or ride to the man of business; and it is to be hoped that rightly conducted it may subserve the same end,—recreation,—and perchance lead to more profitable observances. Even among our more rural populations, we find it necessary to defer to the majorities, and provide a fair fund for premiums for speed; and though it is often said with sombre shakes of the head, that farm work don't need speed, but only strength in horses, and that "Eclipse" would have cut but a sorry figure in a hay wagon, or before a plough, yet the young farmer will tell you that his rights are as much to be respected as his dad's, after he is old enough to take charge of the work, and he needs a quick team before the wagons and mowing machines, and a much quicker one when he goes courting Sunday nights, or attends the farmer's festivals, and other frolics in the winter, or the summer picnics, or even when going to and from town in the course of business.

So that weighing the whole matter, while it is wisest and best to get along without the trotting of horses for speed on our agricultural grounds, it cannot be deemed injudicious or straying out of the proper precincts to indulge the taste of the crowd to a moderate extent, when the circumstances of the society seem to demand it.

But to return to Taunton.

From what remained in the hall it was apparent the show there had been extraordinarily fine, and the plan of each exhibitor having allotted to him ample space for his products, naturally made him desirous to fill it worthily, and the machine work of the president of the society was happily set off by the specimens from his conservatories.

Britannia and silver-plated goods from the manufactory of Reed & Barton, vied in brilliancy with the contributions of other manufacturers and merchants, who, as well as the ladies, were liberal in the display of their wares,—sewing-machines and organs, dry goods and ready-made clothing, contrasting with affghans, quilts, rugs, carpets, mats, patent anchors, carriages, and nearly all the goods we might wish our tutelary gods to provide us with on our passage through this mundane sphere, whether in double or single harness.

Distance lends its enchantment in the superb Zanzibar articles collected and exhibited by Mr. Morse, consisting of a variety of implements of war, ornaments and articles of *vertu* peculiar to some of the African tribes. But works of art—*videlicet*, *pictures*—were few and far between, though we noticed one or two oil paintings, some very good water-colors of vessels, and mechanical drawings, showing that the talent is in the society if properly fostered, as it

should be in all our societies. The remarkable success of the students at the Massachusetts Agricultural College in learning to draw, attests the fact that there is scarcely a person who, if early trained in that direction, may not become sufficiently adept in the art for ordinary practical purposes, and in no calling is its usefulness more apparent than in agriculture. It is the great blot on the escutcheon of the farmer that he not only invents no implements for himself, leaving that to be done by outsiders, but that he pays but little attention to the works of the Creator, amidst which his whole life is passed, and thus his avocation is divested of its most absorbing interest.

It is not to be expected that every farmer will, like the inspired ploughman of Scotland, indite an ode to every daisy he ploughs under, nor like the mason of Cromarty, find "sermons in stones," and discern ammonites in every flagstone his hammer divides; but it should be the aim of all having any oversight of the bringing up of the present generation of agriculturists, to lead them to the study of the soil and the plants and the animals and instruments with which they work, and no readier nor more attractive way can be found than by teaching them to study the parts of these objects, and convey these impressions indelibly to the mind, by producing copies by hand.

The young man who can draw is in a fair way to make improvements in his tools, to become interested in the mechanical part of his calling, to understand the nature of the earth in which he delves for a support, and the phenomena of the vegetable world of which he is a secondary creator; and the young woman, to become a practical botanist, and instead of wasting her time in reading the works of man between yellow covers, will attain the more exquisite enjoyment of the perusal of the works of nature, bound in all the colors of the rainbow.

Commonly at our fairs a sum is put at the disposal of the committee, to be awarded on such articles under the headings of "paintings and works of arts" as they may deem worthy, and as the committee are not apt to be distinguished connoisseurs, the photographs, pencil drawings, oil pictures, — generally mere copies, or tricksey transfers—are, as it were, in hot water, and the least meritorious is as apt to get the highest premium as the best. A photograph should not be allowed to compete with an original painting or drawing; nor the latter with mechanical copies, but each should be in a class by itself, and the premiums so graded, that the real works of art should be awarded the highest. And our agricultural societies can do no better work than in following out

the initiative taken by the college at Amherst, and offering wholesome premiums for drawings from still life and for paintings, and thus encourage the young farmers and their female relatives to develop their talents in such useful and instructive ways. The mere handling and classifying of books in a large library made a most successful naturalist, and the close attention the young give to the implements or plants they copy, if it does not develop the inventor or horticulturist, will assuredly interest others in their callings to such a degree, as to invest the old house and the farm with a lustre more attractive than of yore, and vie, perhaps successfully, with the glitter from the distant fields and prairies of other regions.

Returning again to the spacious hall of the Bristol Society, we find the present Speaker of the House, with his wife, coming, as a wise legislator should, to view and study the products of his constituents; and also the delegate from that society, and his other half, intent, as they had been the whole time of your delegate's visit, to making it agreeable and useful, and in their company, the honey, which appears to be a specialty, was duly inspected, and the dairy department, not preëminent in quantities, though the quality of the butter and cheese was good.

The vegetable products, of which there was an excellent display, and the flowers which bloomed as in parterres, and the fruits of which, considering the season, there was a good variety, the pears and grapes excelling; though one contributor from Vermont had enough kinds of crab-apples to sour the whole district, and use up all the sugar in the town.

In the basement was a large assortment of the heavier agricultural machines, comprising the mowers, tedders, horse-rakes, etc., sent by the manufacturing houses of Boston and Providence; and in fact, the merchants and manufacturers vied with the farmers in making a successful exhibition, even the dentists exhibiting their implements of torture, and the young scholars sending their juvenile drawings, or paintings, or fancy needle-work, and the old ladies and old men treading over again their youthful steps;—one old lady of seventy-five sending fifteen pair of stockings; another of eighty-three, a rug and cushion; and several others of nearly the same age, other home-made fabrics; an old man of eighty-four, some fine specimens of cabinet work; whilst in juxtaposition were the worsted ottoman cover of a six-year-old Bertha; a tidy of an eight-year-old Carrie; a worsted cushion of another six-year-old called Zilpah; and several specimens in wax-work and painting of a young master just at the bottom of the ladder of learning—youth and age thus meeting, and completing the circle of life in useful works.

After this exhausting survey, your delegate was naturally after the manner of men inclined to sit down at a festive board, and whilst partaking of the sensible food, expect that other sort, not always so sensible; but discovered that the part of Hamlet had been left out of the play, no dinner nor orator being provided for the occasion above stairs; a very respectable meal was furnished below. But an exhibition on so grand a scale as that at Taunton, tapers off too finely when the accessories of a social banquet and instructive oratory are omitted; and from the ill-disguised expressions of some of the present managers, they seem to be of like opinion, and the ensuing year will probably revive the past, when a society dinner was provided in the third story of the hall, and guests to the number of eight hundred listened to what Horace Greeley knew about farming, and if any one of them knew half as much, he was richly invested.

Your delegate has perhaps occupied more time than necessary in his review of one day's visit, but as this society has not been reported upon for a year or two, he felt it somewhat incumbent upon him to make amends for other delinquencies, and the objects of interest were so various, as to excite trains of thought, the unburdening of which may, in some slight degree, promote the progress of agricultural prosperity, and the happiness of those directly connected with it.

R. Goodman.

BRISTOL CENTRAL.

The annual exhibition and cattle fair of the Bristol Central Agricultural Society was held on the grounds of the society, at Myrick's, September 20, 21 and 22. The occasion was ushered in with all the beauties of a balmy September morning.

Contestants for the prizes generously offered by the society, came to the place of gathering as from long distances, gradually, but every one with a purpose. An ardent spirit (not liquid) made every one strong in his place, which each seemed to appreciate and understand. This pleasing feature of the occasion was a distinctive guide to the carrying out of the arrangements in the various departments.

A gentle and quiet frame of mind pervaded the assembled multitude, which added beauty and lustre to the whole of the proceedings. This society appears to understand the purpose for which agricultural exhibitions were instituted, that by comparison, information might be imparted and received. Herein lies the great secret which should be sought and studied by the whole community.

The officers of the society appeared perfectly at home in transacting the business necessarily devolving on them, and in their several offices, as well as elsewhere, were attentive and ready to furnish your delegate with information necessary for his purpose. It was a pleasure to witness the precision as well as the decision of the several committees.

The ploughing match was the first effort of the society, and was held on the society's own premises. The soil was not very tenacious, rendering the labor light for the teams. One-eighth of an acre was allotted to each team, and was to be ploughed seven inches deep. Forty minutes were allowed each man to plough his patch. I think that all accomplished their task within the specified time very acceptably, while some got through in time to witness their neighbor's skill.

Seven horse teams and seven ox-teams (one pair each) entered and competed for the prizes. There were, also, two or three cattle teams (two oxen and one horse) that strove for the mastery. The kind of team last mentioned answers very well in light soil, with light cattle, when tempered alike, but in general such teams vary so much in disposition, that both horse and oxen, as well as the driver, and sometimes the ploughman, will become unduly excited, and the fret will prove worse to all concerned than will the same amount of work to a single pair of able-bodied oxen, with quietness at the plough.

The severe drought of the last few seasons so affected our pasture lands, that grazing stock in point of flesh, illy compares with that of former years. This was the case with most of the cattle on exhibition at Myrick's, and yet they would compare well with the cattle in other parts of the State.

Large numbers of cattle, horses, sheep and swine, as well as coops of fowls, were on exhibition. The introduction of the feathered tribe in our public exhibitions, is becoming deservedly very popular. With proper care, perhaps there is no stock in the hands of the farmer that will give a greater net profit on the capital invested, than will the barnyard fowl.

This society enjoys accommodations equal to, and perhaps superior, to most societies in the State. In the upper hall of the large stone building, an almost endless variety of varieties was on exhibition. The ladies' department was well supplied with evidences of taste and skill. To enumerate and to give to each specimen its due meed of praise, is in other and better hands. I cannot, however, refrain from speaking of needlework by the hand of F. A. Nelson, of Lakeville, a miss of eight years old, which would do credit to one far

her superior in age. Such specimens are worthy to be spoken of and more worthy to be imitated.

There was also a miniature bureau, the work of Enoch Hazeltine, of New Bedford, eighty-four years old, worthy to be kept as an heirloom. These articles are not mentioned as being superior in every respect, but as evidence in one case of tact which should be cultivated, and in the other, evidence of skill which should be respected, though it may be waning.

Here were two extremes in age; the ages between these filled a large space in the hall with drawings and needlework, which in the absence in the quantity of fruit usually exhibited, was well timed, showing that while deprived in some measure of nature's products, art stood ready to fill the vacuum. Were it not for our wives and daughters, our exhibitions would be meagre in the sight of men.

The manufacturers of the city of Fall River were not unmindful to place their plank in the broad bridge of improvement, which will soon be so far completed as to enable the genius of this country to quietly pass over and outstrip its foreign counterpart. On this occasion their poster said, "a million of spindles." These spindles are run mostly by steam-power, which is equalled only by the indomitable enterprise of the manufacturer. On exhibition were samples of cloth in their various stages, from the raw material to the handsomely finished goods, ready for the market.

In the floral department was ample evidence of taste for the beautiful,—a taste well worthy of distinctive cultivation. J. M. Godfrey, Esq., of Lakeville, and Dr. Nathan Durfee, of Fall River, were the leading spirits in this part of the exhibition.

For so meagre an exhibition of fruit, its general scarcity was an ample apology, and yet from the grounds of Dr. Durfee and J. P. Newell, Esq., of Fall River, were specimens of fruit creditable to any cultivator in any year. Suspended in a conspicuous place in the hall, was a glass, cage-like in form, filled with grapes from the grounds of Dr. Durfee, hanging in large clusters, and attracting the attention of every one who desired a taste. If the doctor is guilty of no greater sin than laying such temptation before so great a multitude, we think he must be a most happy man. The temptation was great, but the showcase was secure. Every product of the field and garden was represented by its kind.

We found bread and butter and honey. Bread is the most important article of diet to be found on the table of any family. The importance of a good article is understood by many, but it is obtained, comparatively speaking, by few. To make good bread is an art which should be thoroughly studied.

Several lots of honey bespoke the character of the makers; so also did the remark of J. M. Godfrey, one of the exhibitors, tell of his kind regard for a personal friend, when he said to me, "I intend to present one jar of honey to the president of the society."

Of farm implements there was a great variety, not to say assortment. True, some pieces were duplicated; generally single patterns represented the kind, from the mowing machine down to the seed-sower and clipper-wheel hoe for the garden;—tools of almost every description that are used on the farm, showing the interest taken in these occasions by the mechanic, whose labor and skill aid the agricultural and horticultural interests of the State and of the world. If he is to be honored who doubles his crops, of how much praise is he worthy who puts into the hands of the husbandman facilities for accomplishing a purpose so desirable?

Your delegate was exceedingly pleased, after two days' tiresome labor, to find in the department of agricultural implements a hammock, suggestive of rest, which the weary frame was glad to seek, not in it, but at the house of the society's worthy president.

THOMAS W. WARD.

PLYMOUTH.

The farmers of the Old Colony assembled under the inspiration of a delightful September day to celebrate their fifty-second annual festival, September 28th. Their fair grounds at Bridgewater are located about half a mile from the railroad station, and are all that could be desired for the purpose for which they were designed. They contain about sixty acres, surrounded on three sides by a branch of the Taunton River, and the balance by a substantial board fence.

The hall, although spacious and well arranged, is not equal to the ambition of the society, and large improvements are contemplated. It is located on an eminence, near the entrance, and overlooks the whole ground. A grove of several acres in the rear of the hall, well supplied with seats, furnishes a grateful shade to the weary.

The spacious cattle-pens are conveniently arranged, and in this case were filled to overflowing.

A spacious horse barn, with ample sheds for storage of carriages, has been erected for the accommodation of persons visiting the exhibition with their own conveyance.

The ploughing match, the first in the order of exercises, was well contested, fifteen competitors entering for the prizes, most of whom did their work well.

The trial of working oxen came next, with twenty-two entries, showing that the interest in this docile and patient servant of man was well maintained by the sons of the Pilgrims.

A trial of speed immediately followed on the half-mile track, of walking oxen. Four yokes were trotted out for this prize, and made good time on a square walk.

The display of matched fancy, family and trotting horses, although very good, clearly indicated that the fast horse had not yet taken possession of this society.

The exhibition from the State Almshouse—a large wagon loaded with a splendid variety of vegetables, and drawn by five yokes of magnificent oxen—gave evidence that the agricultural department of this institution was in good hands.

The show of cattle was very good, and much larger, I was told, than on any former occasion. The Alderney blood seemed to predominate in the cows and heifers. Some very good Ayrshires were on the ground. A very pleasant feature in this department was the exhibition of all the premium cattle on the track in front of the judges' stand, when the prizes were announced by the president, and the ribbons attached to the prize animals, in the presence of a large number of people, who seemed to take a lively interest in the distribution of the honors. This feature I think worthy of imitation.

Sheep and swine were well but not very numerously represented.

The show of poultry was exceedingly fine.

The hall was filled to overflowing with the usual variety of articles, both useful and ornamental. The splendid display of grapes and pears especially attracted my attention.

The collection of people was very large. It seemed to be a general holiday for the whole surrounding country; the factory operators and mechanics, as well as the farmers, with their wives and children, were there in great numbers, all seemingly intent on having a good time.

The dining-room is in the upper story of the hall, and will accommodate from 400 to 500 persons, and on this occasion every seat was filled.

The popular and energetic president of the society, who had just entered on his seventeenth year of service in that position, had, with his usual forethought, secured the attendance of this board's most eloquent member who, notwithstanding his recent labors in

the political field, was in his happiest mood, and discoursed eloquently and instructively to an appreciative and delighted audience.

On the whole, I can truly report this society to be in a flourishing and prosperous condition, and faithfully performing the purposes of its organization. WM. BIRNIE.

MARSHFIELD.

Agreeably to appointment I attended the annual exhibition of the Marshfield Agricultural Society, held at Marshfield, October 5th, 6th and 7th, 1871. The excursion train of cars on the railroad (branch of the Old Colony) recently opened, landed the crowd, myself among the number, but a short distance from the grounds of the society, on the forenoon of the first day of the exhibition,—a day ushered in with all the beauties of an autumnal morning, and was improved by the farmers in all the surrounding country from early morn to full mid-day, in the gathering in of their displays from the pastures, fields, gardens, orchards, household stores, and workshops, preparatory to the competitions and honors of the exhibition. One of the first I met after entering the grounds, was our worthy brother delegate from this society, who extended to me the kindest of welcomes. Being president of the society, I could not but observe how untiring he was in his exertions to harmonize all,—in short, on hand everywhere, and in his place at all times.

The secretary and directors were at their posts of duty, and, as well as the president, were attentive to all the wants and comforts of the society's guests.

The grounds (sixteen acres) owned by the society, are ample, and well located; the hall commodious, and well arranged for convenience, and I think one of the best I know of.

From what knowledge I had received by report of the Marshfield Society, I had expected much, but I must say I realized more than I had even thought of. Though one of the youngest societies in the State, its muster-roll shows some 900 members, and it possesses property worth about $10,000.

The exhibition in all departments was excellent; every one seemed interested and determined to make it a success, which I would report was such in the highest degree.

The stock first claiming attention, I found to be mostly native, or grade. Of the thoroughbreds only the Jerseys were represented, viz.: four bulls and bullcalves, and three cows, and the same number of heifers. The oxen and steers were not as numerous (twenty-

one pairs) as might have been, judging from the display of oxen in town teams shown the second day. Cows and heifers were well represented in the forty-five fine-looking animals exhibited.

A solitary pen of sheep drew their appropriate share of attention.

The five pens of swine drew constant attention, as well they might; though a homely saying, they were literally "fattened to kill," and I thought the owners must have been engaged in a strife to see who could produce the most fat.

The poultry show, I think, could not be easily surpassed, all the fancy breeds of poultry, ducks, geese, turkeys and pigeons crowded the fifty-six large coops.

The inspection of stock already enumerated; the ploughing match, all accomplished in a workmanlike manner; the championship contested for by five ox teams, and the trial of four pairs of working oxen, on a loaded wagon of 4,000 lbs., blocked to every wheel by a three-inch scantling (no whipping allowed),—finished the first day of the exhibition; and with lowering skies the day that opened so bright, closed, all showing anxiety, yet hoping for a bright morrow; but as many are the hopes that are blasted in the journey of life, so the second day opened stormy and exceedingly unpleasant, but this did not prevent the attendance, so great seemed to be the enthusiasm, of a still larger multitude of visitors than yesterday.

The programme for this day was the exhibition of town teams, in a total of ninety-seven pairs of oxen and steers. These, when formed in the cavalcade, reached more than half around the track. Among these one could see many yoke of oxen that would have done honor to the competing classes of yesterday.

The horses also claimed attention. One stallion, four breeding mares, six colts, four walking horses, three draught, six family, five gents' driving and seven pairs matched. The general exhibition of these was reserved for the third and last day.

The hall drawing now our attention, on entering, the mottoes conspicuously facing the entrance, would first draw attention: "The farmer, he is nature's nobleman;" "In God is our trust." Every experienced eye could see here that for variety and quality, as well as quantity, the success of the exhibition was very apparent.

The five centre tables were devoted to the display of fruit in all varieties. The apples shown here indicated anything but a scarcity, 112 plates of this fruit gracing the tables; and of other fruits 167 plates of pears, 88 of grapes, 32 of peaches, and one tree in a tub laden with this fruit; 25 of quinces, of best quality; 13 of cranberries, from one tub of which specimens could be seen full

fourths of an inch in diameter; one of blackberries, and one of strawberries,—all forming a tempting display. I could not well pass by the 91 jars of canned fruits, without commenting on their splendid appearance; as also the 30 specimens of bread and cake, in tasting which, I noticed the committees had recourse to the 18 boxes of fine golden butter, and the five rich, creamy cheeses.

The table of flowers was one of elegance and taste, and added much to the adornment of the hall.

The table of fancy and useful articles was crowded to overflowing, but space will not permit me to speak of these in detail, mention only being made of the model barque Annie W. Weston, a model of perfection and workmanship.

The antique and curious were well represented in the rare coins, case of shells, etc., and the field-glass taken from off Jeff Davis's desk, at his surrender, speaking loud of the late rebellion.

One entire end of the hall was devoted to sewing machines of various kinds, and to melodeons and organs, around which at all times the crowd seemed to gather.

The basement, or lower hall, I found, without exception, filled with the finest display of farm and garden products it has been my privilege to look upon for a long time, if ever before. Many of the specimens here seen were labelled, Webster place.

Of potatoes, all the different varieties one could conceive of could here be seen, smooth and fair to the highest degree. All classes of vegetables and grains were well represented. I will enumerate only a few. The heaviest squash weighed 101 pounds, while 16 averaged over 60 pounds each. A crook-neck measured two feet and eleven inches long, and weighed 43 pounds. One beet measured over three feet in length, and weighed 21 pounds. Also, cabbages of 23 pounds, sound and firm. These, viewed in connection with the large quantity of vegetables, all of large growth, but not here enumerated, conveyed to the mind of the beholder that either the soil of Marshfield was of a peculiar quality, or that the farmers and producers carried "terræ" culture to a high degree of perfection.

There was also seen a fine display of agricultural implements, stoves, harnesses, wagons and sleighs, marble work, etc., and much more that might be mentioned did space permit; but as the hour for the chief attraction of the day, 1 P. M., drew near, we were called to fall into the procession, led by the Hanover band, which furnished excellent music for the exhibition, and marched to the third story of the society's hall, to partake of the excellent dinner, to which some five hundred did ample justice; after which the intellectual

feast was spread out by the president in words of cheer and hope, the past being reviewed, the success of the present over the past, and the hopes for the future were portrayed in eloquent language.

General Schouler, an old friend of Webster, was called on to respond as such, and gave many instructive reminiscences of our honored statesman, whose home and interests were here.

Dr. G. B. Loring was next called to respond to "Massachusetts," and was received by hearty cheers, and held the audience more than an hour with his usual eloquence and instruction.

"To the Marshfield Agricultural Society," Rev. E. P. Dyer added his original and entertaining poem, and this closed the programme of the day.

The third and last day proved fair and genial, and was devoted to outdoor enjoyments, rural sports, gymnastic performances, foot-race, fox-hunt and a display of horses on the track, all of which passed off agreeably.

And as in time to come I look back to the enjoyment received at this exhibition, I can but remember with gratitude, the kindness shown me by the officers of the society, and the kind hospitality extended me by our worthy associate, G. M. Baker, and his estimable lady.

Enos W. Boise.

BARNSTABLE COUNTY.

The twenty-eighth annual cattle show and fair of the Barnstable County Agricultural Society was held October 3d and 4th.

The exhibition was in all respects creditable to the society. The display of fruits, especially pears, was large, and indicated great care and skill in cultivation. The same is true of the quinces, peaches and grapes, the specimens of the last indicating that the soil and climate of this section of the State are peculiarly adapted to this valuable fruit.

The quantity of vegetables exhibited was large, and the quality excellent; and there really seemed to be evidence that the importance of vegetable growing is at last fully recognized by the farmers of Barnstable County.

The samples of grain and other field crops deservedly attracted great interest, and, as might be expected, the cranberry appeared in great perfection.

The exhibition of animals indicated a determination to excel in this branch of husbandry, the most difficult, undoubtedly, which the farmer on Cape Cod undertakes. It cannot be expected that

the short pastures and thin soil of the county of Barnstable should produce cattle able to vie with those grown on the fertile and luxuriant regions of the interior. And it was with unfeigned pleasure, therefore, that the delegate from this Board witnessed the admirable specimens of cattle, young and old, which filled the pens. It seemed as if all the obstacles which nature has thrown in the way of cattle-husbandry there had been overcome, and dairy animals of good selection were abundant. The exhibition of fat cattle was small, and considering the fact that the business of stall feeding is entirely unprofitable, and the pastures are unfitted for fattening in this region, it is undoubtedly the part of wisdom for the farmers here to raise no more beef than would naturally go along with the necessary feeding of cattle for the dairy or labor.

The collection of horses, sheep and swine was good, and a better display of poultry has not been made by this society for many years.

I find among the statements made by this society with regard to crops, the following:—

Amount of corn raised on an acre, bushels,	60½
Value of the crop, including "stalks and husks,"	$93 50
Expense of raising,	56 50
Profit of the acre,	$37 00
Amount of turnips raised on an acre, bushels,	580
Value of the crop, as sold,	$352 00
Cost of cultivation,	123 00
Profit of the acre,	$229 00
Amount of potatoes raised on an acre, bushels,	335
Value of crop, as sold,	$201 00
Cost of cultivation,	72 00
Profit of the acre,	$129 00

These statements are entitled to the careful consideration of all farmers.

That the exhibition of this society was attended with unusual attractions it is almost unnecessary to state, in view of the customs it has observed for so many years, and for which it has become celebrated. That the people of Barnstable showed unbounded hospitality to the visitors on this occasion, every one will realize who has been brought by accident or design within their kind and genial circle.

Geo. B. Loring.

NANTUCKET.

The sixteenth annual cattle show and fair of this society was held at Nantucket, on Wednesday and Thursday, the 27th and 28th of September last. I had the pleasure of an appointment as a delegate from this Board, and was received by the officers of that society with great cordiality. For the many attentions I received I am greatly indebted to the hospitality and kindness of Andrew M. Myrick, Esq., its president, and the secretary, Alexander Macy, Jr., Esq. Its citizens are renowned for their hospitality the world over.

Nantucket bears in some respects a close resemblance to Cape Cod, and is not supposed to have much soil that would enable even an industrious farmer to flourish, and yet many of its agricultural products compare favorably with other parts of Massachusetts. It is admitted, however, that if it has not as good soil to boast of, it is productive of fine men and women.

The fair on both days was held upon the grounds of the society, and was attended by a large number who manifested an interest in the exhibition of a goodly number of horses, colts, neat cattle, swine and poultry.

The enclosures for neat cattle were all filled, the thoroughbreds presenting for this section of the State a fine display. Several fine bulls, a few working oxen and steers, and fat cattle were on exhibition. Of grade cows there were sixty-nine entries, and there are but few societies in Massachusetts that could exhibit a better variety of good milch cows. One of the farmers, while exhibiting his products of roots, grain, cabbages, etc., said these were all for his cows. Everything he raised was for them, except a few garden vegetables for his table, and feed for his swine and poultry. He sold nothing from his farm but milk and butter, and some poultry and eggs. Others might raise premium crops for market, but he confined his undivided attention to his dairy. He carefully noted the milking qualities of each cow, kept a daily record in a tabular form, of the quantity and weight of milk from each, and thereby he knew whether he had any that did not pay for their keeping. His monthly account of butter was carefully kept and credited to the farm. His dairy yielding 1,500 pounds of butter, from eight or nine milch cows, which was sold the past year for fifty cents per pound. It may well be added that it is with agriculture as with manufactures and the mechanic arts, that success is dependent on making a specialty of one branch, one department, in concentrated labor.

In looking over the grades, strong marks of the ancestry were discernible. The beautiful Jersey and Ayrshire were both there. Mr. Alexander Macy in his report says, that he would venture an opinion that it is possible to have a dairy cow from a superior native cow, and a Jersey or an Ayrshire bull, that may be as good a milker as any thoroughbred.

We think there were many such on exhibition at the recent fair, but we must admit the arguments of thoroughbreeders, that no dependence can be put upon the character of their offspring. We would, however, recommend grading as the next best to thoroughbreeding, but urge upon all the selection of well formed good natives or grades, for grading.

Of the native stock of cows there was not a great number. By comparing them with the scores of cattle present, the same report says, it would seem a self-evident fact that native cows will soon become extinct, from the fact that the Jersey and Ayrshire element has diffused itself throughout the island, until scarcely a farm or barnyard in the county or township can be found where one or the other does not predominate.

The ploughing came off in the afternoon of the first day, and the several competitors made good work. The soil was light, and the work could be done rapidly. There were six entries,—four being teams of horses, and two were ox teams. At the signal given each team started to plough twenty rods of ground apiece, which was done in a workmanlike manner.

There were fourteen entries of stallions, mares and colts, several of them presenting many points of excellence. Of single family horses there were five entries. There was some good trotting on the track by F. C. Sanford, Esq., with his "General Grant," and by Captain Richard Gibbs, with his swift steed, together with several excellent family horses. Some of the horses on exhibition would do credit to any society in the State.

The fair at the hall was opened Wednesday evening by the president, and speeches and music followed. Here the display of vegetables and fruit was very fine. The corn, the mammoth squashes and the Early Rose potatoes were of the very best quality. Appropriate to this department which graced the hall, was the motto, "The sea and soil: we have ploughed both, and both have yielded their harvest."

The display of butter and cheese was also very creditable. Of these there were nine entries.

The collection of fruit was not so large as on some former occa-

sions, but excellent specimens of greenhouse grapes were exhibited. Some fine specimens of pears were also shown.

The ladies of the island had arranged the tables in the hall in octagon form, and covered them with handsome specimens of fruit, articles of mechanical ingenuity and beautiful designs of embroidery and needlework. Their motto was, that "Our Fair should ever reward and honor the *Husband*-man." The display (not large) embraced fine specimens of needle and worsted work, and manifested much skill and industry.

I am induced to remark in conclusion, that there is no section of Massachusetts where the allowance from the public treasury for the encouragement or improvement of agriculture or manufactures is so important, or calculated to do so much good as here. Its inhabitants are isolated from the mainland, and frequently during the winter months, cut off from any communication with the outside world. Unfortunately for the progress of this society, there has been a want of interest felt in relation to its welfare. With the waning interest of all productive business on the island, this society has experienced an apathetic feeling from many of its members, and from its citizens generally, but this depression, I am happy to know from its very efficient secretary, has been less felt the past year than for several previous years; and a new impulse was transmitted to efforts that were made, not only to bring forward a good show of stock, vegetables, fruit and articles of ingenuity and taste, but to arouse the friends of this valuable county institution to a necessity of being liberal in donations of labor and money, and what they felt able in premiums to replenish the depleted treasury. The appeals made by the president have met with a generous reponse, and with the continued aid from the State, this society is destined in the future to be one of the most useful.

The exhibition closed on Thursday evening with a brilliant ball, which was given at Atlantic Hall.

S. B. Phinney.

MARTHA'S VINEYARD.

The fourteenth annual exhibition of this society was held at West Tisbury, on the 3d and 4th of October, two weeks earlier than in former years.

The weather was remarkable, at least it seemed so to your delegate, who had never been sent to sea on such business before, and hardly knew what to expect. The "Vineyard Gazette," in its account of the occasion, remarked as follows: "All the elements con-

spire to have a regular 'blow out' at each successive anniversary of our agricultural fair, and the attempt on the part of the society to get the start of the elements aforesaid, by having the gathering two weeks earlier than usual, proved a lamentable failure." The sky was overcast most of the time, and there was a powerful storm of wind and sand, but fortunately no rain. Nevertheless the people turned out freely from all parts of the island, except from Gay Head, where the colored population were engaged in picking cranberries from the marshes. These are under the control of the town authorities, who appoint the time for the annual harvest, and who were apparently not aware of the change in the time of the cattle show. The addition of a hundred or two of this mixed race in holiday attire, would have been an interesting feature of the exhibition, and would doubtless have been satisfactory evidence to some minds, that this bizarre population, chameleon-like, took their varied hues from the parti-colored strata on which they live.

Nowhere in the United States can so large a number of persons be gathered on a public occasion with a smaller admixture of foreign blood. The men and women at the fair were genuine Yankees, of the active, sober-minded, but enterprising kind. The commodious hall belonging to the society is conveniently located in the village, and is therefore available for various public uses during the year. The grounds around are suitably enclosed, and are sufficiently large to afford room for the exhibition of stock, while the track for horses is half a mile away, and unfenced.

The patriotism of the people was manifested by the beautiful star-spangled banner which waved over them during the fair, and their religious faith by the appropriate inscription on the front of the hall: "Honor the Lord with thy substance and with the first fruits of thine increase, so shall thy barns be filled with plenty." There was also abundant evidence that the great majority of the islanders were heartily interested in the objects of the society, and the general testimony of all from whom inquiries were made, was to the effect that important benefits had resulted from its organization and efforts.

The exhibition in the hall would compare favorably with the average throughout the State. In some respects it was remarkably good. The display of butter was such as to demonstrate the natural adaptation of the island to the production of this important article. The number of entries was large, and the quality exceedingly uniform and fine, both in color, hardness and flavor. Notwithstanding these possibilities, there is not enough produced for home consumption.

The Indian corn, potatoes, roots and garden vegetables were most excellent, and in great variety. In fact, larger, smoother, more perfect specimens are rarely seen. One red field-beet weighed thirty-five pounds, or more than half a bushel; and the turnips of several sorts were in nearly the same proportion. Nothing is more evident than that the soil is well suited to yield abundantly of nearly all the crops usually cultivated in Massachusetts.

The fruits were in considerable variety, and in some cases, of superior qualities. Finer quinces or cranberries it would be difficult to find. The town of Tisbury sent to market this season 100 barrels of quinces and 1,000 barrels of cranberries. Some seedling apples were shown, which were said to be admirably suited to the somewhat peculiar climate of this locality. Excellent peaches were also exhibited, mostly of seedling varieties.

Native grapes, in very compact clusters, and well ripened, were displayed in profusion, as if to prove the propriety of the name, Martha's Vineyard. There were several plates of the hardier sorts of improved grapes of fair quality. The collection of fruit, wines, jellies and preserves was extensive, the wife of the president of the society leading off with twenty-one varieties.

The tables were loaded with useful and ornamental articles, the handiwork of the ladies, and handsomely adorned with bouquets of autumnal flowers. The most noticeable of these consisted of immense clusters of blue hydrangeas, which were grown without winter protection, in the garden of the delegate to this Board, at Chilmark.

The number of neat cattle at the show was nearly 200, and included a large number of excellent Ayrshires. This breed seems to have been wisely chosen for the improvement of the native stock, and has already largely increased its value.

The sheep of the island are a small, hardy breed, which, like the native deer, are able to shift for themselves through the entire year. When the land is covered with snow and ice, they are able to subsist on the seaweed which is washed ashore by the cold, rough waves of the Atlantic. These sheep dress about forty pounds, and their fleeces weigh about three pounds. The quality of the wool is very good. The treatment of this breed is such as none of our improved breeds will endure, and therefore attempts to introduce them have not resulted satisfactorily.

The number of horses entered for premiums was only twenty-eight, and these were not remarkable either for size or speed. But little attention is given to breeding, and most of the horses in use are imported from the main land, and the greater number of these seem to have been selected in consideration of their past services

rather than for prospective usefulness. Sailors are not distinguished for skill in horsemanship, and can hardly be expected to excel in raising or using horses. Still they ought to consider that a young, healthy horse is not kept more easily in good condition, but is vastly more serviceable than one which has seen his best days. The most pressing wants of the farmers of the Vineyard seem to be stout, active teams and improved agricultural implements. There was not a good pair of farm horses, nor any farm implements requiring the use of a horse, to be seen at the fair.

The premium for the best ploughing, with either horses or oxen, amounted to ten dollars, and brought into the field a single yoke of oxen. Your delegate found them doing their work in good style, without the inspiriting influence of either competitors or spectators, except two members of the awarding committee, and was informed that this team generally took the first premium.

The practical difficulty in the way of rapid progress in agriculture in this society, seems to lie in the fact that enterprising young men look rather to the sea than to the land for their support They purpose to live on the farm, but not by farming. Their families must have homes where they hope to enjoy life, when they are not engaged in what seems to them a more agreeable and profitable employment than the cultivation of the soil. Doubtless the excitement inseparably connected with the dangers and uncertainties of sea life, and the comparatively large gains sometimes easily and quickly made, are most alluring to the stalwart youth, whose head is filled with the yarns of the old whalers, as they recount their youthful adventures. It would be very surprising if men who had spent many years in the forecastle, should become in after-life ambitious to excel in farming, and demand more convenient buildings, better stock, teams and tools, more fruits and flowers, than their fathers and neighbors possessed.

Nevertheless the picture has a brighter side, and there can be little doubt that great progress will be achieved during the next few years. Sea life offers much less pecuniary inducements than in years past, while the influx of summer visitors, who are already numbered by thousands, will decidedly increase the demand for farm and garden produce, and compel more attention to the methods of an enlightened agriculture.

The thanks of your delegate are due the officers of the society, as well as the past and present members of the Board, who kindly afforded him every facility for the acquisition of valuable knowledge, and provided abundantly for his personal comfort.

W. S. Clark.

FINANCES OF THE SOCIETIES.

SOCIETIES.	Amount receiv'd from the Commonwealth.	Income fr'm permanent fund.	New members & donations.	All other sources.	Receipts for the year.	Prems. offered.	Prem's and gratuities paid.	Current expen's for the year—not including premiums and gratuities.	Disbursem'ts for the year.	Indebtedness.	Value of real estate	Value of personal property.	Permanent fund.
Barnstable,	$587 55	–	$53 00	$636 40	$1,276 95	$877 00	$674 81	$1,239 87	$1,914 68	$1,637 73	$6,000 00	$200 00	$5 200 00
Berkshire,	600 00	$679 25	259 00	2,579 97	4,118 22	2,820 00	2,649 00	1,362 00	3,762 03	–	12,000 00	500 00	12,500 00
Bristol,	600 00	–	330 00	9,284 88	10,214 88	4,200 00	3,131 50	10,392 73	13,524 23	12,000 00	41,830 00	300 00	29,830 00
Bristol Central,	600 00	–	15 00	3,271 28	3,886 28	3,570 00	2,150 00	1,733 82	–	5,816 00	20,000 00	500 00	14,684 00
Deerfield Valley,	–	–	3,152 15	2,158 10	5,310 25	565 00	527 90	328 66	5,169 38	1,266 23	4 094 01	10 00	2,827 78
Essex,	600 00	1,423 82	207 00	–	3,716 90	2,315 00	1,001 25	2,034 01	3,035 26	–	8,000 00	13,697 38	21,697 38
Franklin,	600 00	120 00	242 50	1,347 48	2,309 98	1,463 50	1,024 00	1,238 52	2,262 52	–	7.000 00	–	9,000 50
Hampden,	600 00	–	57 50	2,699 43	3,356 93	2,429 75	640 25	2,398 56	3,038 91	24,769 00	35.000 00	500 00	10,731 00
Hampden East,	600 00	175 00	67 50	92 47	967 14	1,124 65	618 40	175 00	967 20	2,100 50	7,000 00	300 00	4,500 00
Hampshire,	600 00	621 07	100 00	21 90	1,335 97	1,470 00	814 18	882 30	1,720 48	1,000 00	5,900 00	500 00	5,400 00
Hampshire, Franklin & Hampden,	600 00	221 00	221 00	2,858 75	3,679 75	1,009 75	818 75	2,408 06	3,678 28	1,950 00	8,500 00	500 00	7.050 00
Highland,	600 00	109 83	48 00	572 75	1,330 58	781 50	604 25	726 33	1,330 58	66 94	3,000 00	1,700 00	4,700 00
Hingham,	600 00	–	2,605 00	9,407 35	12,612 35	1,845 10	1,273 35	12,121 65	13,395 00	1,000 00	32,406 59	3,934 05	31,406 59
Hoosac Valley,	600 00	82 37	501 00	2,211 44	3,394 81	1,445 00	1,137 50	1,031 50	3,028 84	3,200 00	9,000 00	1,032 57	9,000 00
Housatonic,	600 00	–	100 00	4,247 91	4,947 91	2,228 00	1,951 00	4,121 47	5,317 12	369 21	9,000 00	75 00	9,000 00
Marshfield,	600 00	–	259 60	7,057 10	7,916 70	1,157 75	693 66	7,233 04	7,916 70	6,400 00	11,215 00	865 46	5,680 46
Massachusetts,	–	3,895 08	–	–	3,895 08	–	3,888 00	495 53	4,883 53	–	–	59,229 34	59,229 34

Martha's Vineyard,	$600 00	$637 77	$299 65	$78 50	$1,486 83	$835 25	$719 68	$1,026 23	$1,782 31	$50 00	$3,477 00	$3,384 01	$6,861 00
Middlesex, . .	600 00	–	898 00	2,707 11	4,205 11	2,060 00	1,442 50	1,925 00	3,367 50	14,000 09	25,000 00	1,000 00	12,000 00
Middlesex North, .	600 00	–	31 00	–	20,726 53	–	3,654 25	13,876 21	17,153 99	2,400 00	20,000 00	300 00	17,600 00
Middlesex South, .	600 00	–	158.00	3,726 00	4,478 00	1,841 00	1,114 50	1,528 00	5,127 00	–	18,000 00	–	18,000 00
Nantucket, .	509 50	–	183 50	274 78	975 78	1,006 50	588 50	319 91	908 41	–	2,500 00	450 00	2,950 00
Norfolk, . . .	600 00	–	61 00	2,655 50	3,316 50	2,534 25	1,394 85	1,910 65	3,305 50	20,000 00	30,000 00	400 00	17,900 00
Plymouth, . .	600 00	210 00	321 75	6,633 53	7,765 28	2,776 07	2,166 07	1,670 38	6,165 82	–	25,000 00	1,000 00	27,599 46
Union, ...	427 84	–	111 67	819 00	1,358 51	619 25	372 75	985 76	1,358 51	1,600 00	4,600 00	400 00	3,400 00
Worcester, . .	600 00	250 00	205 00	4,916 43	5,971 43	2,576 00	1,918 31	2,869 63	3,692 68	28,500 00	100,000 00	1,000 00	72,500 00
Worcester North, .	600 00	–	60 00	2,429 05	3.089 05	2,226 75	1,414 70	2,332 36	2,103 62	9.800 00	16,000 00	–	6,200 00
Worcester N. West,	600 00	–	182 50	4,064 42	4,846 92	1,430 00	1,123 11	1,139 32	4,215 52	12,250 00	15,300 00	1,771 37	4,821 31
Worcester South, .	600 00	2,320 32	96 00	921 11	3,241 44	1,129 50	828 50	2,412 94	3,241 44	7,000 00	12,765 30	1,450 59	7,155 89
Worcester S. East,	600 00	–	74 00	2,002 90	2,676 90	1,950 25	1,023 00	1,449 61	2,472 61	4,500 00	10,000 00	1,000 00	6,500 00
Worcester West, .	600 00	200 00	15 00	3,698 22	4,513 22	1.871 25	1,436 44	1,063 80	3 875 24	3,728 00	13,650 00	1,501 67	9,922 00
Totals, . .	$17,124 89	$10,945 47	$10,915 32	$83,473 76	$143,182 18	$52,129 07	$42,695 96	$84,330 85	$133,754 88	$165,403 61	$516,277 90	$87,501 44	$356,846 71

PERMANENT FUND—HOW INVESTED.

MASSACHUSETTS.—Bank stock, policies, Boston and U S. bonds.
ESSEX.—In real estate, bank stock, U.S. & R.R. bonds, library, tent and cattle pens.
MIDDLESEX.—In real estate, furniture and fixtures to building
MIDDLESEX NORTH.—In land, buildings and personal property.
MIDDLESEX SOUTH.—In the society's grounds, building track, stalls, sheds and pens.
WORCESTER.—In real estate.
WORCESTER WEST.—In real estate and fixtures.
WORCESTER NORTHWEST.—In grounds and buildings of the soc'y, personal property and cash in hand.
WORCESTER NORTH.—In real estate.
WORCESTER SOUTH.—In land, hall and track, furniture in hall and fixtures.
WORCESTER S. EAST —In real and personal estate.
HAMPSHIRE, FRANKLIN AND HAMPDEN.—In real estate and personal property.
HAMPSHIRE.—In real estate and hall.
HIGHLAND —In savings bank, U. S. bonds and mortgage
HAMPDEN —In land and buildings.
HAMPDEN EAST.—In real estate, cattle pens, &c.
UNION.—In land, hall, track, furniture in hall, &c.
FRANKLIN.—
HOUSATONIC.—
BERKSHIRE.—In real estate.
HOOSAC VALLEY.—In real estate.
DEERFIELD VALLEY.—In real estate.
NORFOLK.—In real estate.
BRISTOL.—In real estate and personal property.
BRISTOL CENTRAL —In real estate, farm and buildings with appurtenances.
PLYMOUTH.—In real estate, fixtures and furniture, notes and cash.
MARSHFIELD —In land, buildings and hall furniture.
HINGHAM.—In hall and grounds, furniture and fixtures, two dwelling-houses
BARNSTABLE.—In land, buildings and fences.
NANTUCKET.—In fair grounds, office fixtures and cash.
MARTHA'S VINEYARD.—In real estate and notes of members.

ANALYSIS OF PREMIUMS AND GRATUITIES AWARDED.

FARMS.

SOCIETIES.	For management of farms.	For experiments in draining.	For subsoiling.	For ploughing at exhibition.	For reclaiming swamp lands.	For experim'ts with manures.	For spading.	For hedges and ornamental trees	For reclaiming old pastures.	For orchards of all kinds.	For cranberries.	For other farm improvements.	Total amount offered for farm improvements.	Total am't awarded for farm improvements.	Total am't actually paid for farm improvements.
Barnstable,	–	–	–	$26 00	–	–	–	–	–	–	$3 00	–	$84 00	$29 00	$29 00
Berkshire,	$50 00	–	–	48 00	$10 00	$18 00	–	–	–	$36 00	3 00	–	175 00	165 00	165 00
Bristol,	–	–	–	282 00	–	–	–	–	–	–	–	–	450 00	282 00	–
Bristol Central,	–	–	–	67 00	–	–	–	–	–	–	6 00	–	112 00	73 09	73 00
Deerfield Valley,	–	–	–	–	–	–	–	–	–	–	2 00	–	–	–	–
Essex,	30 00	–	–	109 00	–	–	–	–	–	–	–	–	524 00	139 00	139 00
Franklin,	–	–	–	25 00	–	5 00	–	–	–	–	–	–	44 00	30 00	30 00
Hampden,	–	$10 00	–	–	–	–	–	–	–	–	–	–	244 00	10 00	10 00
Hampden East,	12 00	–	–	28 00	–	–	–	–	–	–	–	–	139 00	40 00	40 00
Hampshire,	–	–	–	–	–	–	–	$15 00	–	15 00	–	$26 00	169 00	56 00	–
Hamps. Franklin & Hampd.,	–	–	–	–	–	–	–	–	–	–	3 00	–	23 00	3 00	3 00
Highland,	–	–	–	–	–	–	–	–	–	–	–	–	15 00	–	–
Hingham,	–	–	–	15 00	–	–	$9 00	–	–	–	10 00	–	196 00	34 00	34 00
Hoosac Valley,	–	15 00	–	–	–	14 00	–	–	–	15 00	–	–	41 00	29 00	29 00
Housatonic,	30 00	–	–	35 00	–	–	–	–	–	48 00	–	75 00	216 00	188 00	188 00

Marshfield,	–	–	–	$25 00	–	–	–	–	–	$10 00	$18 00	$10 00	$141 00	$63 00	$63 00
Martha's Vineyard,	–	–	–	5 00	–	$8 00	–	–	–	–	7 15	–	62 00	20 15	20 15
Middlesex,	–	–	–	67 00	–	–	–	–	–	–	–	–	332 00	67 00	67 00
Middlesex North,	–	–	–	–	–	–	–	–	–	–	–	–	–*	–*	–*
Middlesex South,	–	–	–	55 00	–	–	–	–	–	24 00	–	–	226 00	79 00	79 00
Nantucket,	–	–	–	16 00	$6 00	–	–	–	–	–	–	8 00	112 00	30 00	30 00
Norfolk,	–	–	–	73 00	–	–	–	–	–	–	–	–	550 00	73 00	90 00
Plymouth,	–	–	–	66 00	–	–	–	–	–	–	–	–	96 00	66 00	66 00
Union,	–	–	–	–	5 00	–	–	–	$5 00	6 00	1 50	3 00	20 50	8 50	8 50
Worcester,	–	–	–	60 00	–	–	–	–	–	–	–	–	60 00	66 00	67 30
Worcester North,	$75 00	–	–	–	–	–	–	–	–	–	10 00	–	85 00	85 00	–
Worcester North-West,	–	–	–	7 00	–	–	–	–	–	–	–	–	13 00	7 00	3 00
Worcester South,	–	–	–	58 00	–	–	–	–	–	–	1 00	–	–	–	–
Worcester South-East,	–	–	–	92 00	–	–	–	–	–	–	–	–	234 00	92 00	90 00
Worcester West,	–	–	–	69 00	–	–	–	–	–	–	–	–	129 00	69 00	69 00
Totals,	$197 00	$25 00	–	$1,268 00	$21 00	$45 00	$9 00	$15 00	$5 00	$154 00	$62 65	$122 00	$4,502 50	$1,733 65	$1,392 95

* In connection with New England Agricultural Society.

Analysis of Premiums and Gratuities Awarded—Continued.

FARM STOCK.

SOCIETIES.	For Bulls.	For Milch Cows.	For Heifers.	For Calves.	For Working Oxen.	For Steers	For Fat Cattle.	For Horses.	For Sheep.	For Swine.	For Poultry.	All other Stock.	Total amount offered for Live Stock.	Total amount awarded for Live Stock.	Total amount paid out for Live Stock.
Barnstable,	$15 00	$6 00	$21 00	$8 00	$23 00	$17 00	$23 00	$157 00	$9 00	$29 00	$14 00	–	$348 00	$322 00	$322 00
Berkshire,	155 00	105 00	77 00	–	45 00	43 00	38 00	316 00	125 00	46 00	50 00	$36 00	1,136 00	985 00	978 00
Bristol,	78 00	128 00	141 00	56 00	120 00	41 00	139 00	275 00	49 00	66 00	131 00	–	1,400 00	1,224 00	–
Bristol Central,	87 00	186 00*	–	–	58 00	39 00	50 00	1,213 00	15 00	52 00	109 50	–	2,296 00	1,809 50	–
Deerfield Valley,	17 00	28 50	18 00	17 00	63 00	25 00	–	129 00	16 50	15 00	4 00	–	–	–	–
Essex,	40 00	70 00	67 00	–	53 00	19 00	23 00	190 00	22 00	29 00	46 50	–	775 00	559 50	486 00
Franklin,	83 00	133 00	12 00	18 00	30 00	56 00	18 00	183 00	70 00	26 00	15 25	64 00	859 00	708 25	702 75
Hampden,	61 00	81 00	74 00	18 00	45 00	23 00	20 00	286 00	18 00	21 00	22 00	104 00	1,175 00	773 00	507 50
Hampden East,	26 00	21 00	24 00	3 00	30 00	21 00	52 00	179 00	29 00	11 00	18 00	–	590 00	414 00	386 00
Hampshire,	35 00	66 00	24 00	11 00	15 00	36 00	–	183 00	33 00	38 00	41 00	127 00	711 00	672 00	621 00
Hampshire, Franklin & Hampden,	78 00	31 00	51 50	24 00	115 00	16 00	114 00	209 00	51 00	26 00	8 00	104 00	715 50	805 50	672 50
Highland,	26 00	27 00	18 50	4 25	34 00	17 50	15 00	154 00	47 00	9 00	6 00	75 00	488 25	433 25	433 25
Hingham,	42 00	71 50	54 00	32 00	52 00	–	41 00	83 00	43 00	95 00	20 50	48 00	885 00	585 00	585 00
Hoosac Valley,	31 00	31 00	14 00	2 00	23 00	13 00	11 00	177 00	109 00	17 00	40 00	15 00	660 00	483 00	483 00
Housatonic,	49 00	79 00	35 00	24 00	52 00	31 00	23 00	164 00	65 00	32 00	41 00	114 00	850 00	709 00	709 00

Marshfield,	$7 00	$19 00	$33 00	$10 00	$21 00	–	$29 00	$66 00	$6 00	$25 00	$34 00	–	$403 75	$250 00	$235 00
Martha's Vineyard,	19 00	35 00	34 25	8 25	22 00	$37 75	45 00	49 00	34 00	10 00	8 75	$13 00	350 25	316 00	315 25
Middlesex,	32 00	118 00	22 00	14 00	18 00	–	18 00	189 00	–	45 00	108 50	125 00	813 00	689 50	689 50
Middlesex North,	–	–	–	–	–	–	–	–	–	–	–	–	–†	–†	–†
Middlesex South,	19 00	49 00	20 00	8 00	28 00	–	12 00	480 00	16 00	53 00	95 00	15 00	885 00	795 00	361 00
Nantucket,	30 00	80 00	27 00	3 50	12 00	13 00	30 00	70 00	12 00	26 00	27 00	–	434 25	340 75	340 75
Norfolk,	8 00	27 00	3 00	–	6 00	–	–	816 00	–	53 00	158 50	–	1,254 00	1,071 50	738 00
Plymouth,	74 00	166 00	40 92	39 00	72 50	30 00	89 40	677 00	57 00	36 00	73 50	33 00	1,732 00	1,382 32	1,382 32
Union,	18 75	15 50	7 00	–	28 50	9 50	6 00	84 75	–	2 00	5 00	21 00	372 00	198 00	198 00
Worcester,	107 00	32 00	42 00	5 00	48 00	126 00	32 00	970 00	23 00	38 00	15 00	–	2,187 00	1,870 00	1,755 26
Worcester North,	52 00	80 00	42 00	52 00	65 00	37 00	27 00	120 00	12 00	47 00	19 00	57 00	647 00	610 00	383 00
Worcester North-West,	10 00	25 00	27 00	14 00	12 00	26 00	29 00	730 00	19 00	18 00	8 00	55 00	1,156 00	973 00	922 00
Worcester South,	36 00	28 00	59 00	24 00	54 00	39 00	19 00	245 00	6 00	31 00	6 00	46 75	789 50	593 75	593 75
Worcester South-East,	22 00	40 00	25 00	13 00	77 00	48 00	–	143 00	14 00	27 00	15 00	24 00	555 50	448 00	404 00
Worcester West,	68 00	82 00	21 00	26 00	60 00	42 00	47 00	703 00	18 00	32 00	14 00	24 00	1,357 00	1,137 00	1 119 50
Totals,	$1,323 75	$1,830 00	1,034 17	$434 00	$1,282 00	$795 75	$950 40	$9,240 75	$918 00	$955 00	1,154 00	1,100 75	$25,827 00	$21,157 82	$16,303 33

* Milch Cows, Heifers and Calves.

† In connection with New England Agricultural Society.

Analysis of Premiums and Gratuities Awarded—Continued.

FARM PRODUCTS.

SOCIETIES.	Indian Corn.	Wheat.	Rye.	Barley.	Oats.	Beans.	Grass Crops.	Grass Seeds.	Potatoes.	Carrots.	Beets.	Parsnips.	English Turnips.	Ruta Bagas.	Onions.	Other Root Crops.
Barnstable,	$14 00	–	–	–	–	–	–	–	$10 00	$4 00	$3 00	–	–	$5 00	$4 00	–
Berkshire,	56 00	$20 00	$56 00	$35 00	$56 00	$14 00	$12 00	$9 00	75 00	12 00	12 00	–	$12 00	12 00	–	$63 00
Bristol,	15 00	–	10 00	–	–	–	15 00	–	–	–	6 00	–	–	–	–	138 00
Bristol Central,	56 00	–	3 00	–	–	5 00	2 00	–	20 25	–	1 25	$1 00	7 00	–	17 25	21 25
Deerfield Valley,	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Essex,	10 00	–	10 00	–	–	–	–	–	10 00	–	–	–	–	10 00	20 00	–
Franklin,	11 00	15 00	8 00	–	50	–	–	–	2 25	25	25	–	8 00	–	75	–
Hampden,	14 50	–	–	–	–	–	–	–	12 25	–	75	50	50	–	1 00	–
Hampden East,	1 50	1 50	1 25	–	75	1 25	–	–	1 50	–	50	50	1 75	1 25	50	–
Hampshire,	–	6 00	3 00	–	3 00	1 00	–	–	12 00	3 00	3 00	3 00	3 00	2 00	6 00	
Hamps., Franklin & Hampden,	1 50	6 00	1 00	–	–	–	–	–	50	–	–	–	50	–	–	12 00
Highland,	12 50	–	–	6 00	6 00	–	5 00	–	11 00	6 00	2 00	–	–	–	25	4 00
Hingham,	16 00	–	6 00	4 00	–	–	–	–	–	–	–	–	–	–	–	–
Hoosac Valley,	21 00	15 00	15 00	15 00	15 00	6 00	14 00	19 00	21 00	3 00	6 00	–	–	6 00	–	5 00
Housatonic,	96 00	43 00	57 00	17 00	49 00	6 00	18 00	36 00	27 00	12 00	21 00	–	9 00	–	–	–

Marshfield,	$44 50	–	$7 00	–	$0 75	$4 50	–	–	$15 50	$4 00	$5 00	–	$14 00	–	$5 00	$5 00
Martha's Vineyard,	33 75	$0 10	10 40	$5 10	15 47	4 95	$10 00	–	26 40	3 22	1 49	–	9 33	–	1 07	–
Middlesex,	8 00	–	2 00	–	–	–	–	–	3 00	2 00	5 00	$3 00	2 00	$2 00	6 00	101 00
Middlesex North,	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Middlesex South,	80 00	8 00	–	5 00	5 00	.	–	–	10 00	–	–	–	–	13 75	5 00	30 25
Nantucket,	11 00	–	–	10 00	10 00	–	–	–	–	–	4 00	–	–	–	–	–
Norfolk,	–	–	–	–	–	–	–	$7 00	–	–	–	–	–	–	–	79 00
Plymouth,	20 00	–	14 00	–	10 00	6 00	–	–	12 00	–	8 00	–	12 00	–	–	–
Union,	9 00	–	2 00	3 00	3 00	–	3 00	3 00	3 75	–	–	–	2 00	–	–	3 25
Worcester,	3 00	3 00	6 00	1 00	3 00	1 00	–	–	6 00	1 00	2 00	1 00	–	1 00	1 00	26 00
Worcester North,	27 75	25 00	–	–	–	50	–	–	4 50	–	1 25	–	75	–	1 25	29 75
Worcester North-West,	4 00	4 00	3 00	3 00	3 00	1 00	–	–	3 00	–	1 00	–	1 00	–	–	4 00
Worcester South,	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Worcester South-East,	10 00	–	–	–	–	–	–	–	3 00	–	4 00	–	–	4 00	3 00	–
Worcester West,	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Totals,	$576 00	$146 60	$214 65	$104 10	$180 47	$51 20	$79 00	$74 00	$291 90	$50 47	$87 59	$9 00	$82 83	$57 00	$72 07	$521 50

Analysis of Premiums and Gratuities Awarded—Continued.

FARM PRODUCTS—Concluded.

SOCIETIES.	Total amount offered for Grain and Root Crops.	Total am't awarded for Grain and Root Crops.	Total am't paid for Grain and Root Crops.	For Fruits.	For Flowers.	Any other cultivated Crops.	Butter.	Cheese.	Honey.	Wheat Bread.	Rye and Indian Bread.	Corn Bread.	Total am't paid out under the head of Farm Products.
Barnstable,	$91 00	$40 00	$40 00	$48 25	$36 50	$44 25	$9 00	$4 00	$5 00	$6 00	$6 00	$4 00	$203 00
Berkshire,	468 00	444 00	444 00	76 00	23 00	158 00	41 00	54 00	10 00	20 00	9 00	10 00	845 00
Bristol,	520 00	184 00	–	94 00	40 00	–	44 00	20 00	65 00	10 00	8 00	–	–
Bristol Central,	246 00	134 00	–	79 25	27 00	–	25 00	19 00	18 00	3 50	1 00	–	–
Deerfield Valley,	–	–	–	–	–	–	–	–	–	–	–	–	–
Essex,	170 00	60 00	40 00	167 50	33 00	76 00	28 00	5 00	9 00	10 00	–	–	365 00
Franklin,	175 00	47 50	46 00	75 50	23 00	9 00	15 00	15 00	3 50	5 25	7 00	5 00	186 25
Hampden,	526 00	29 50	24 00	40 75	–	27 75	15 00	–	3 00	4 00	3 00	2 00	84 50
Hampden East,	125 96	12 25	12 25	27 75	14 75	31 25	9 00	9 00	–	3 00	3 00	3 00	113 00
Hampshire,	54 00	52 00	44 00	71 00	37 00	34 00	15 00	10 00	–	12 00	6 00	–	250 00
Hampshire, Franklin & Hampden,	83 00	25 50	23 50	51 00	12 50	–	8 00	4 00	1 00	3 50	4 50	–	67 25
Highland,	93 50	65 25	65 25	8 75	4 50	13 75	6 50	6 00	2 00	75	75	1 00	97 75
Hingham,	160 00	26 00	26 00	137 05	38 65	49 70	21 00	–	15 95	6 50	–	–	294 85
Hoosac Valley,	215 00	193 00	193 00	57 00	15 00	76 00	21 00	28 00	3 00	6 50	5 00	4 50	408 00
Housatonic,	516 00	415 00	415 00	143 00	42 00	24 00	36 00	46 00	13 00	14 00	13 00	–	722 00

Marshfield,	$121 00	$105 25	$102 74	$45 62	$29 00	$16 50	$15 00	$15 00	$19 95	$4 50	–	–	$246 32
Martha's Vineyard,	167 00	121 28	120 98	72 25	8 15	–	14 50	50	–	6 75	$4 25	$4 00	231 38
Middlesex,	174 00	134 00	134 00	273 50	37 00	–	20 00	–	–	12 00	12 00	6 00	494 50
Middlesex North,	–*	–*	–*	–	–	–	–	–	–	–	–	–	–*
Middlesex South,	172 00	108 00	108 00	61 75	27 00	40 75	14 00	–	16 00	8 00	3 00	–	271 00
Nantucket,	135 00	35 00	35 00	44 75	20 25	–	21 50	50	3 00	5 00	1 00	–	131 00
Norfolk,	168 00	86 00	47 00	162 00	41 00	–	13 00	5 00	–	8 00	5 00	–	169 00
Plymouth,	203 00	102 00	102 00	97 25	32 25	20 00	39 00	34 00	3 50	15 00	15 00	–	338 00
Union,	64 00	32 00	32 00	13 75	6 25	–	5 00	10 50	1 50	1 50	3 50	2 25	76 25
Worcester,	60 50	55 00	25 00	25 00	14 00	–	23 00	51 00	–	1 00	50	–	32 00
Worcester North,	–	90 75	74 50	65 75	20 00	1 00	17 00	–	2 00	3 50	–	3 50	168 50
Worcester North-West,	30 00	27 00	24 00	35 00	12 00	5 00	9 00	11 00	–	3 00	3 00	–	97 00
Worcester South,	50 00	–	–	37 75	5 00	21 00	9 00	18 00	25	12 00	6 00	–	109 00
Worcester South-East,	140 00	53 75	37 25	62 00	17 00	–	14 00	7 00	6 25	3 00	1 50	–	139 50
Worcester West,	79 00	–	–	56 00	29 50	18 25	10 00	46 00	–	6 00	6 00	–	163 50
Totals,	$5,006 96	$2,677 03	$2,235 47	$2,137 17	$645 30	$666 20	$517 50	$418 50	$200 90	$194 25	$127 00	$45 25	$6,303 55

* In connection with New England Agricultural Society.

ANALYSIS OF PREMIUMS AND GRATUITIES AWARDED—Concluded.

MISCELLANEOUS.

SOCIETIES.	For Agricultural Implements.	Offered for raising forest trees.	Awarded for the same.	For experiments on manures.	Amount awarded for objects strictly agricultural, not specified before.	For objects not strictly agricultural; domestic manufactures, &c.	No. of persons who received premiums and gratuities.
Barnstable,	–	–	–	–	–	$120 81	234
Berkshire,	$88 00	–	–	–	$213 00	360 00	612
Bristol,	50 00	$20 00	–	–	–	1,325 00	680
Bristol Central,	50 00	–	–	–	–	215 50	238
Deerfield Valley,	–	–	–	–	–	–	–
Essex,	32 00	36 00	–	$25 00	–	103 00	284
Franklin,	24 00	22 00	$5 00	–	6 00	84 25	256
Hampden,	73 00	15 00	–	–	–	53 50	68
Hampden East,	14 00	–	–	–	–	–	–
Hampshire,	16 00	30 00	40 00	–	–	–	146
Hampshire, Franklin and Hampden,	29 00	20 00	–	–	–	84 00	140
Highland,	4 75	–	–	–	–	68 50	159
Hingham,	10 00	–	–	–	–	347 45	–
Hoosac Valley,	18 00	–	–	14 00	47 00	199 00	295
Housatonic,	34 00	–	–	–	–	298 00	353
Marshfield,	–	50 00	–	–	180 00	140 60	278
Martha's Vineyard,	2 00	25 00	11 00	16 00	21 65	108 35	266
Massachusetts,	100 00	–	–	3,000 00	–	788 00	–
Middlesex,	34 00	–	–	–	–	157 50	255
Middlesex North,	–	–	–	–	–	–	–*
Middlesex South,	46 00	60 00	–	–	43 00	85 00	99
Nantucket,	–	13 00	–	16 00	74 00	93 00	110
Norfolk,	–	25 00	–	6 00	–	39 30	165
Plymouth,	22 00	60 00	–	–	88 50	369 25	434
Union,	–	–	–	–	37 25	53 25	146
Worcester,	15 00	22 00	–	–	–	38 75	156
Worcester North,	34 00	50 00	–	–	10 00	815 75	142
Worcester N. West,	8 00	30 00	–	–	4 00	107 50	144
Worcester South,	4 50	35 00	–	19 00	–	43 25	196
Worcester South-East,	7 00	30 00	–	–	–	467 50	229
Worcester West,	–	30 00	–	10 00	–	125 64	185
Totals,	$615 25	$573 00	$56 00	$106 00	$724 40	$4,944 65	6,270

* In connection with the New England Agricultural Society.

NAMES of Cities and Towns to which the Premiums and Gratuities are disbursed and the amount to each.

BARNSTABLE.

Barnstable,	$347 06	Sandwich,	$21 50
Dennis,	16 00	West Barnstable,	157 50
Hyannis,	87 50	Yarmouth,	38 00
Orleans,	7 25	Total,	$674 81

BERKSHIRE.

Adams,	$139 00	Monterey,	$1 00
Alford,	29 00	New Ashford,	31 00
Auburn, N. Y.,	4 00	Peru,	50
Becket,	3 00	Pittsfield,	780 00
Boston,	2 00	Richmond,	80 00
Cheshire,	137 50	Savoy,	5 50
Dalton,	94 00	Sheffield,	78 50
Egremont,	8 00	Stockbridge,	173 50
Great Barrington,	40 00	West Stockbridge,	3 00
Hancock,	29 50	Whitneyville, Ct.,	2 00
Hinsdale,	80 00	Williamstown,	78 00
Lanesborough,	271 00	Windsor,	5 00
Lee,	226 50		
Lenox,	259 50	Total,	$2,649 00

BRISTOL CENTRAL.

Acushnet,	$83 50	Freetown,	$44 50
Berkley,	141 75	Lakeville,	166 75
Boston,	20 00	Mansfield,	50 00
Bridgewater,	119 00	New Bedford,	669 50
Campello,	5 00	Newport, R. I.,	3 00
Dartmouth,	55 25	Norton,	45 75
Dighton,	19 00	Providence, R. I.,	3 00
Fairhaven,	125 50	Raynham,	84 50
Fall River,	306 00	Rehoboth,	10 00

BRISTOL CENTRAL—Concluded.

Rochester,	$20 50	Westport,	$13 50
Somerset,	23 50	Worcester,	3 00
Taunton,	432 25	Total,	$2,454 75

ESSEX.

Amesbury,	$11 00	Lynn,	$6 00
Andover,	1 00	Marblehead,	22 00
Beverly,	19 00	Manchester,	2 00
Boston,	14 00	Methuen,	10 00
Boxford,	8 00	Newbury,	111 00
Bradford,	25 00	Newburyport,	67 00
Danvers,	70 00	North Andover,	58 00
Essex,	15 00	Peabody,	85 00
Georgetown,	18 00	Rowley,	8 00
Gloucester,	5 00	Salem,	109 00
Groveland,	34 00	Saugus,	8 00
Hamilton,	127 00	Topsfield,	24 00
Haverhill,	11 00	Wenham,	31 00
Ipswich,	295 00	West Newbury,	66 00
Lawrence,	8 00	Total,	$1,268 00

FRANKLIN.

Belchertown,	$6 00	Greenfield,	$147 00
Bernardston,	17 50	Heath,	5 00
Boston,	10 00	Leverett,	17 50
Buckland,	10 50	Leyden,	19 00
Charlemont,	6 00	Montague,	9 75
Chicopee Falls,	15 00	Northfield,	21 00
Coleraine,	20 50	Shelburne,	396 50
Conway,	27 50	Sunderland,	64 75
Deerfield,	173 75	Whately,	11 75
Erving,	1 00	Wilmington, Vt.,	25 00
Gill,	19 00	Total,	$1,024 00

HAMPDEN.

Blandford,	$1 50	Springfield,	$235 75
Chicopee,	93 50	Westfield,	15 00
Longmeadow,	91 50	West Springfield,	158 00
Ludlow,	12 00	Wilbraham,	25 00
Monson,	6 00		
Palmer,	2 00	Total,	$640 25

HAMPDEN EAST.

Belchertown,	$45 00	Palmer,	$199 31
Brimfield,	22 00	Sturbridge,	45 00
Holland,	7 00	Warren,	6 00
Ludlow,	12 00	Wilbraham,	58 87
Monson,	230 10	Total,	$618 20

HAMPSHIRE.

Amherst,	$216 93	Northampton,	$81 50
Belchertown,	73 00	Pelham,	26 00
Chicopee,	10 00	Prescott,	5 00
Conway,	5 00	Shutesbury,	10 00
Enfield,	20 50	South Hadley,	100 00
Granby,	5 00	Southampton,	6 50
Hadley,	126 50	Sunderland,	75 50
Leverett,	38 75		
Montague,	7 00	Total,	$817 18

HAMPSHIRE, FRANKLIN AND HAMPDEN.

Amherst,	$5 00	Hadley,	$52 50
Chesterfield,	8 50	Hatfield,	71 50
Chicopee,	15 50	Leverett,	4 00
Conway,	4 00	Middlefield,	10 00
Deerfield,	144 00	Northampton,	219 00
Easthampton,	22 00	Prescott,	4 00
Gill,	16 00	Shelburne,	71 00
Goshen,	4 00	South Hadley,	72 00

HAMPSHIRE, FRANKLIN AND HAMPDEN—Concluded.

Southampton,	$47 75	Westhampton,	$5 00
Springfield,	18 00	Williamsburg,	13 00
Sunderland,	12 00	Total,	$818 75

HIGHLAND.

Becket,	$36 50	Montgomery,	$0 25
Blandford,	1 00	North Granby,	10 00
Cheshire,	50	Northampton,	5 50
Chester,	56 50	Peru,	60 25
Cleveland, O.,	50	Plainfield,	50
Cummington,	5 00	Sandisfield,	4 00
Florence,	2 00	Springfield,	7 00
Hinsdale,	138 50	Stockbridge,	4 00
Huntington,	4 00	Washington,	5 50
Lee,	30 00	West Fitchburg,	2 00
Lanesborough,	10 00	Worthington,	17 25
Middlefield,	203 50	Total,	$604 25

HINGHAM.

Boston,	$24 25	Quincy,	$52 10
Cohasset,	31 60	Scituate,	10 00
Hanover,	45 75	South Scituate,	43 40
Hull,	6 50	Weymouth,	63 70
Hingham,	984 80		
Marshfield,	10 25	Total,	$1,273 35

HOOSAC VALLEY.

Cheshire,	$102 00	Peru,	$5 00
Clarksburg,	8 00	Pittsfield,	15 00
Florida,	40 00	Pownal, Vt.,	31 50
Hinsdale,	7 00	Savoy,	50
Lanesborough,	7 25	South Adams,	121 00
Lenox,	18 00	Stamford, Vt.,	6 50
New Ashford,	1 75	Williamstown,	304 25
North Adams,	469 75	Total,	$1,137 50

HOUSATONIC.

Adams,	$12 00	Mount Washington,	$14 00
Alford,	86 00	New Marlborough,	56 00
Egremont,	184 00	Pittsfield,	26 00
Great Barrington,	511 00	Richmond,	20 00
Lanesborough,	22 00	Sheffield,	423 00
Lee,	170 00	Stockbridge,	135 00
Lenox,	78 00	West Stockbridge,	68 00
Monterey,	20 00	Total,	$1,825 00

MARSHFIELD.

Abington,	$12 50	Medford,	$2 75
Boston,	5 90	North Bridgewater,	3 50
Brighton,	1 00	Pembroke,	42 60
Cambridge,	2 51	Plymouth,	6 00
Cohasset,	1 00	Plympton,	3 25
Duxbury,	128 75	Scituate,	25 25
East Bridgewater,	8 00	South Scituate,	22 50
Everett,	2 00	Weymouth,	14 50
Hanover,	10 50	Wollaston,	5 00
Hanson,	4 25	Revere,	4 00
Kingston,	25 20		
Marshfield,	391 46	Total,	$722 41

MARTHA'S VINEYARD.

Chilmark,	$322 41	Tisbury,	$311 93
Edgartown,	88 64	Total,	$722 98

MIDDLESEX.

Acton,	$90 75	Cambridge,	$5 00
Arlington,	68 50	Cambridgeport,	87 00
Belmont,	96 00	Carlisle,	28 25
Bedford,	47 25	Concord,	276 75
Billerica,	2 75	Dunstable,	1 00
Boston,	10 00	Framingham,	3 00
Burlington,	48 00	Groton,	4 00

MIDDLESEX—Concluded.

Hudson,	$33 00	Stoneham,	$23 50
Lincoln,	124 00	Waltham,	110 75
Lexington,	96 50	Watertown,	7 00
Littleton,	17 00	Wayland,	17 00
Lowell,	10 00	Westford,	50
Malden,	9 00	Weston,	49 50
Maynard,	2 50	Winchester,	43 00
Providence,	7 00	Woburn,	72 75
Somerville,	7 00	Worcester,	10 00
Sudbury,	32 50		
Stow,	1 75	Total,	$1,442 50

MIDDLESEX SOUTH.

Ashland,	$24 75	Southborough,	$43 00
Framingham,	560 75	Sudbury,	39 75
Holliston,	3 00	Wayland,	47 00
Marlborough,	13 50	Out of the district,	14 00
Natick,	22 25	Total,	$768 00

NANTUCKET.

Nantucket,	$588 50

NORFOLK.

Boston,	$30 00	Medway,	$0 75
Brookline,	18 00	Milton,	217 00
Canton,	42 25	Needham,	268 00
Dedham,	97 00	Randolph,	11 50
Dorchester,	57 75	Roxbury,	66 00
Dover,	19 75	Sharon,	22 25
Foxborough,	43 00	Stoughton,	69 50
Framingham,	20 00	West Roxbury,	72 50
Franklin,	17 00	Weymouth,	110 00
Hyde Park,	147 00		
Medfield,	6 00	Total,	$1,455 25

PLYMOUTH.

Abington,	$28 75	New Bedford,	$25 00
Boston,	7 00	New York,	1 00
Bridgewater,	545 00	North Bridgewater,	273 75
Duxbury,	7 05	Pembroke,	4 00
East Bridgewater,	168 25	Plymouth,	152 00
Halifax,	422 23	Plympton,	32 21
Hanson,	2 75	Rochester,	1 00
Hingham,	35 00	Taunton,	159 00
Kingston,	48 87	Wareham,	10 00
Lakeville,	46 21	West Bridgewater,	242 00
Mansfield,	5 00	West Meriden, Ct.,	2 00
Marshfield,	1 00	Weymouth,	2 00
Mattapoisett,	14 00		
Middleborough,	111 00	Total,	$2,166 07

UNION.

Agawam,	$3 00	Montgomery,	$1 00
Blandford,	249 55	Otis,	5 50
Becket,	2 00	Palmer,	4 00
Boston,	50	Russell,	8 00
Chester,	17 00	Sandisfield,	4 00
Chicopee,	3 00	Westfield,	22 00
East Granville,	14 50	West Granville,	35 20
Gaylordsville,	1 00		
Middlefield,	2 50	Total,	$372 75

WORCESTER.

Barre,	$8 00	Princeton,	$50 12
Bolton,	18 25	Shrewsbury,	32 97
Charlton,	33 70	Sutton,	163 02
Grafton,	19 22	Spencer,	30 00
Holden,	1 00	Warren,	8 00
Lancaster,	1 50	West Boylston,	33 65
Mendon,	20 60	Westborough,	92 56
Millbury,	120 22	Webster,	55 00
New Braintree,	3 00	Worcester,	1,222 50
Oxford,	8 00	Total,	$1,918 31

WORCESTER NORTH.

Ashby,	$1 50	Sterling,	$20 00
Ashburnham,	87	South Royalston,	10 00
Barre,	7 00	Templeton,	20 00
Fitchburg,	967 00	Westminster,	7 00
Harvard,	50	Winchendon,	30 00
Leominster,	134 23	Wilton, N. H,	10 00
Lunenburg,	141 00		
Princeton,	65 50	Total,	$1,412 80

WORCESTER NORTH-WEST.

Amherst,	$3 00	Palmer,	$10 00
Ashburnham,	25	Petersham,	27 75
Athol,	212 37	Phillipston,	135 00
Barre,	31 00	Royalston,	48 50
Boston,	202 00	Orange,	18 00
Brattleborough, Vt.,	2 00	Templeton,	30 50
Erving,	95 00	Southborough,	5 33
Farmington, Me.,	25 00	Waterbury, Ct.,	75 00
Fitchburg,	106 75	Warwick,	50
Framingham,	25 00	Winchendon,	30 66
Hardwick,	10 00	Worcester,	20 00
New Salem,	5 50		
Northfield,	4 00	Total,	$1,123 11

WORCESTER SOUTH.

Barre,	$17 00	Sturbridge,	$139 75
Brimfield,	18 00	Sutton,	55 00
Brookfield,	48 75	Warren,	104 50
Charlton,	130 25	Webster,	89 00
Dudley,	50 50	Worcester,	15 00
Holland,	14 50	Westborough,	25 00
Oxford,	15 00		
Spencer,	15 00	Total,	$828 50
Southbridge,	95 75		

WORCESTER SOUTH-EAST.

Bellingham,	$5 50	Millbury,	$28 00
Blackstone,	35 50	Sutton,	36 00
Framingham,	227 00	Upton,	63 00
Grafton,	22 00	Uxbridge,	16 00
Holliston,	28 00	Webster,	75 00
Hopkinton,	32 25	Westborough,	16 75
Medway,	9 00		
Mendon,	103 75	Total,	$1,023 00
Milford,	325 25		

WORCESTER WEST.

Athol,	$4 50	Oakham,	$29 62
Barre,	457 07	Petersham,	2 50
Brookfield,	27 00	Phillipston,	26 00
Charlton,	48 00	Princeton,	26 00
Erving,	30 00	Palmer,	108 00
Hardwick,	110 00	Sutton,	16 00
Hubbardston,	75	Sturbridge,	14 00
Holden,	10 00	Templeton,	15 00
Holyoke,	35 00	Waterbury,	150 00
Fitchburg,	31 75	Worcester	101 00
Framingham,	75 00	Warren,	22 00
New Braintree,	78 25		
North Brookfield,	19 00	Total,	$1,436 44

ABSTRACT OF RETURNS

OF THE

AGRICULTURAL SOCIETIES

OF

MASSACHUSETTS

1871.

EDITED BY

CHARLES L. FLINT,

SECRETARY OF THE STATE BOARD OF AGRICULTURE.

BOSTON:

WRIGHT & POTTER, STATE PRINTERS,

79 Milk Street (corner of Federal).

1872.

PREFACE.

The returns of the various agricultural societies for the past year show an improvement over those of most previous years, though they are still far short of what they should be. The State has manifested not only a large liberality in continuing its bounties for the promotion and encouragement of agriculture, but a striking degree of forbearance towards those societies that neglect wholly to comply with the spirit of the law. A portion of the societies are alive to the spirit of the age, and are doing a noble work for the development and improvement of the agricultural and industrial interests of the community. They spare no pains to collect and diffuse information, and to awaken a healthful emulation.

Another class of societies, though having a name to live, are yet dead, so far as any influence they exert beyond their own limits; and they might as well be dead so far as anything they do within their limits is concerned. In some respects they do a positive injury rather than good. They seem to act on the principle that the sole end and aim of a society is to make a great noise and excitement on the day of exhibition, and that their duty to the State and to the community ends here. Their whole management, as it appears through their printed Transactions, is on a low plane wholly unworthy of them. In some instances they go so far as to award premiums and gratuities to men, to satisfy this farmer or that, or to avoid incurring his displeasure, rather than to the animals or articles that really deserve them. Not a few societies are open to this serious charge, and hence many grade or otherwise inferior breeding animals, decorated with the highest honors of the society, go forth to deceive and mislead those who cannot judge of their merit, and take it for granted, as they have a right to, that they would not

have received the prizes had they been regarded by the committees as inferior. No society can honestly award a first prize on a second or third rate animal or article.

But the point in which a society is most apt to fail is in the deficiencies of its permanent record. A low level of effort here marks and stamps the whole character of the society, and it ought to be felt and understood that duty to the public requires something more than the bare list of awards; that the Transactions, or the printed record which goes out to the world, is a fair sample of the *brains* of a society. By these it ought to be judged. By these it ought to stand or fall.

CHARLES L. FLINT.

Boston, January, 1872.

OFFICERS OF THE AGRICULTURAL SOCIETIES.
1872.

MASSACHUSETTS.

President—THOMAS MOTLEY, of West Roxbury.
Secretary—C. S. SARGENT, of Brookline.

ESSEX.

President—WILLIAM SUTTON, of Peabody.
Secretary—CHARLES P. PRESTON, of Danvers.

MIDDLESEX.

President—JOHN CUMMINGS, of Woburn.
Secretary—JOHN B. MOORE, of Concord.

MIDDLESEX SOUTH.

President—GEORGE B. BROWN, of Framingham.
Secretary—JAMES W. BROWN, of Framingham.

MIDDLESEX NORTH.

President—ELIJAH M. READ, of Tewksbury.
Secretary—E. T. ROWELL, of Lowell.

WORCESTER.

President—CHARLES B. PRATT, of Worcester.
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WORCESTER WEST.

President—GEORGE M. BUTTRICK, of Barre.
Secretary—CHARLES BRIMBLECOM, of Barre.

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Secretary—LEMUEL C. FERRY, of Northampton.

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President—PHINEAS STEDMAN, of Chicopee.
Secretary—J. N. BAGG, of West Springfield.

HAMPDEN EAST.

President—J. S. BLAIR, of Brimfield.
Secretary—GEORGE ROBINSON, of Palmer.

UNION.

President—WATSON E. BOISE, of Blandford.
Secretary—H. P. ROBINSON, of Blandford.

FRANKLIN.

President—JAMES M. CRAFTS, of Whateley.
Secretary—SAMUEL J. LYONS, of Greenfield.

DEERFIELD VALLEY.

President—ROGER H. LEAVITT, of Charlemont.
Secretery—W. E. MANSFIELD, of Charlemont.

BERKSHIRE.

President—JOHN E. MERRILL, of Pittsfield.
Secretary—WILLIAM H. MURRAY, of Pittsfield.

HOUSATONIC.

President—THOMAS H. CURTIS, of Great Barrington.
Secretary—HENRY T. ROBBINS, of Great Barrington.

HOOSAC VALLEY.

President—J. M. COLE, of Williamstown.
Secretary—H. CLAY BLISS, of North Adams.

NORFOLK.

President—HENRY S. RUSSELL, of Milton.
Secretary—HENRY O. HILDRETH, of Dedham.

BRISTOL.

President—WILLIAM MASON, of Taunton.
Secretary—EZRA DAVOL, of Taunton.

BRISTOL CENTRAL.

President—JOHN A. HAWES, of Fairhaven.
Secretary—CHARLES DURFEE, of Fall River.

PLYMOUTH.

President—CHARLES G. DAVIS, of Plymouth.
Secretary—LAFAYETTE KEITH, of Bridgewater.

HINGHAM.

President—ALBERT FEARING, of Hingham.
Secretary—FEARING BURR, of Hingham.

MARSHFIELD.

President—GEORGE M. BAKER, of Marshfield.
Secretary—FRANCIS COLLAMORE, of Pembroke.

BARNSTABLE.

President—LEVI L. GOODSPEED, of West Barnstable.
Secretary—CHARLES F. SWIFT, of Barnstable.

NANTUCKET.

President—ANDREW M. MYRICK, of Nantucket.
Secretary—ALEXANDER MACY, JR., of Nantucket.

MARTHA'S VINEYARD.

President—CONSTANT NORTON, of Edgartown.
Secretary—WILLIAM J. ROTCH, of West Tisbury.

AGRICULTURAL EXHIBITIONS.

1872.

ESSEX, at *Gloucester*, ... September 24 and 25.
MIDDLESEX, at *Concord*, ... September 24 and 25.
MIDDLESEX NORTH, at *Lowell*, ... September 26 and 27.
MIDDLESEX SOUTH, at *Framingham*, . . September 17 and 18.
WORCESTER, at *Worcester*, ... September 19 and 20.
WORCESTER WEST, at *Barre*, ... September 26 and 27.
WORCESTER NORTH, at *Fitchburg*, . . . September 24 and 25.
WORCESTER NORTH-WEST, at *Athol*, . . October 2 and 3.
WORCESTER SOUTH, at *Sturbridge*, . . . September 12 and 13.
WORCESTER SOUTH-EAST, at *Milford*, . . September 24 and 25.
HAMPSHIRE, FRANKLIN AND HAMPDEN, at *Northampton*, ... October 3 and 4.
HAMPSHIRE, at *Amherst*, ... September 24 and 25.
HIGHLAND, at *Middlefield*, ... September 12 and 13.
HAMPDEN, at *Springfield*, ... October 1 and 2.
HAMPDEN EAST, at *Palmer*, ... October 8 and 9.
UNION, at *Blandford*, ... September 19 and 20.
FRANKLIN, at *Greenfield*, ... September 26 and 27.
DEERFIELD VALLEY, at *Charlemont*, . . September 24 and 25.
BERKSHIRE, at *Pittsfield*, ... October 1, 2 and 3.
HOUSATONIC, at *Great Barrington*, . . . September 25, 26 and 27.
HOOSAC VALLEY, at *North Adams*, . . . September 17, 18 and 19.
NORFOLK, at *Readville*, ... September 12 and 13.
BRISTOL, at *Taunton*, ... September 24, 25 and 26.
BRISTOL CENTRAL, at *Myrick's*, ... September 18, 19 and 20.
PLYMOUTH, at *Bridgewater*, ... September 26, 27 and 28.
HINGHAM, at *Hingham*, ... September 25 and 26.
MARSHFIELD, at *Marshfield*, ... October 2, 3 and 4.
BARNSTABLE, at *Barnstable*, ... October 1 and 2.
NANTUCKET, at *Nantucket*, ... September 25 and 26.
MARTHA'S VINEYARD, at *West Tisbury*, . . October 1 and 2.

AGRICULTURE OF MASSACHUSETTS.

PROGRESS IN AGRICULTURE.

From an Address before the Berkshire Agricultural Society.

BY THOMAS ALLEN.

Sixty years ago last month, the Berkshire Society for the Promotion of Agriculture and Manufactures, was organized in Pittsfield, and is the oldest existing continuous county organization of the kind in the United States.

The seed of this exhibition was planted in 1807, when Elkanah Watson tethered a merino ram and ewe under the old elm on the "green" in the centre of the town. This led to the introduction of merino sheep, principally from the flock of Chancellor Livingston, of the State of New York. Then came, by the importation of Mr. Watson, the Holderness or Teeswater cattle, bred in England probably from the Dutch, and which by subsequent mixing with the blood of the Devons, gave to this country its red oxen, and established or modified the stock known as native cattle. In 1810 came a show which was the forerunner of similar events to come, being voluntary and without organization or rewards, and a respectable result of a simple published appeal to the farmers. At this period, while civil war was raging in Spain, one of your citizens, Mr. Jonathan Allen, was in Lisbon, where he went to find some of the celebrated flocks of Spanish merino sheep known as the Transhumantes or travelling race, which had been confiscated by some of the Spanish juntas and sent there for sale. He brought away one hundred, and appeared in this town with a portion of them in November, 1810. Where now the Cotswold feeds in the pastures of your president, fifty to sixty years

ago rambled the black-looking, fine-woolled merinos of the Spanish grandee, the Count of Montaco.

These events led to the charter of incorporation of your society the ensuing winter, and in the fall of 1811, just sixty years ago, our fathers organized your society, and inaugurated that series of "Cattle Shows and Fairs" which has distinguished your history and continued regularly and annually from that day to the present. Your first fair of 1811 was a novelty and a success, and produced an impression which remains vivid upon the memory of those now living who witnessed it.

EFFECT OF THE EXAMPLE.

Your example had a wide influence upon the country, and your peculiar model was referred to and imitated in many parts. That suggestion of one of your old citizens, Ebenezer Center, that a committee should annually visit and report upon the growing crops, and which has continued to be one of the most useful of your regulations, was unique and original.

ENCOURAGEMENT TO MANUFACTURERS.

In view of a war with Great Britain, which was foreseen, and which broke out in 1812, the necessity of domestic manufactures was at once realized. Therefore your society began its career by offering the highest rewards for woad and madder and woollen and linen cloth. At that time more or less of spinning and weaving was done in every farm-house for supplies of clothing, and wool and flax and woad and madder became common productions.

At your first exhibition of cloth, the distinguished and patriotic first president of your society, Elkanah Watson, who labored with great zeal through a long life in the cause of agriculture and internal improvements, announced to the ladies present, with much exultation, that the President of the United States (then Mr. Madison) and the President frigate (the pride of the American navy, afterwards unfortunate) were both clothed from the woollen and duck looms of Pittsfield. With such encouraging success, your society continued for many years to offer the highest rewards to manufactures. I can remember when merino bucks brought prices which you would

now deem fabulous, and as merino wool brought $2 per pound, the cultivation of sheep was profitable. Under the circumstances, the fathers of the society regarded domestic manufactures as of equal importance to the tillage of the earth; or perhaps, more properly, they introduced agriculture and manufactures as twin daughters, whom they would nurse in their infancy, leading them forward hand in hand, manufactures needing and receiving at first the most stimulus.

The first minister of your town, your first president and many of the early leaders of your society, with prophetic eye, foresaw the destiny of the county as the proper seat of manufactures, and clearly predicted what we have lived to realize. Your manufactures have quite outgrown your local market, and now, with largely increased fixed capital, and greatly improved power and machinery, and the help of rapid and cheap transportation, they buy their wool in the remotest parts of this hemisphere, and even in Australia and South Africa, and send their varied products to the great cities of the seaboard and the far West. Whether the President yet wears your cloth or not is immaterial; he might do worse, yet you have supplied not only the soldiers of the Union, but thousands of the sovereign people of the various States, and your soft and beautiful blankets cover the sleepers in nearly all the palace cars of the various railroads which net our vast country like a web. All honor, then, to the pioneers who led the way into this beautiful region when it was a wilderness, and who laid the foundations of this society, and of the other civil as well as religious institutions which have become established, which we now so much enjoy, and which it will be our proud privilege to transmit unimpaired, if not improved, to our posterity.

EARLY ADVICE.

Fifty years ago, the president of your society, father of your present speaker, in the annual address remarked that education, commerce and manufactures were receiving the fostering aid of the government, while "agriculture, the parent of all, seems to have been deserted and neglected by all."

At that time these material interests were in comparative infancy, and needed all the aid they received. They have continued to receive bounties and protection until education is

free and universal, our manufactures have become established and advanced almost beyond the necessity of protection, and our commerce reaches every country and people on the globe. But as to agriculture, he said the high price of labor was out of proportion to the price of commodities raised by the farmers, so that the expenses absorbed all the profits, and he saw no hope of a favorable change, and therefore he urged upon the society, as a remedy, to be "actively engaged in the inventing and improving all instruments of husbandry calculated to save labor." That was the advice of a sound and prophetic judgment, from one who was then grappling with the difficulties of agriculture, and it was coincident with the key-note which sounded the onward march which has carried American agriculture to its present height of prosperity.

IMPROVED CONDITION OF FARMERS.

It is true that the merino sheep of that day have nearly disappeared from your hills; you could hardly to-day bring out into grand procession so many yokes of oxen in a string as your fathers did sixty years ago; but you can trot out more horses, with which you do quicker work; you do not find it profitable to raise beef, or to grow winter wheat; you grow no flax; you weave not, neither do you spin; yet your condition is doubtless greatly improved; you live in better houses, your farms have better buildings; you have improved machinery, by which you can accomplish more with less manual labor; your families are more comfortably fed and clad, and better educated; you have a market for all your produce; you ride in better carriages, which nobody makes as good as you do, and you drive faster horses, and you have learnt your own powers, what your soil and climate are adapted for; you have learnt the principle of coöperation to produce larger and better results; you know how to select your stock, whether vegetable or animal, for the special purpose you most desire, and you know that by diligence and wisely directed effort there is nothing of the genuine advantages of our advanced civilization which you cannot avail yourselves of and appropriate as your own.

GENERAL RESULT—COMMERCE—TRANSPORTATION, EAST AND WEST.

The general result then, is, that both your manufactures and your agriculture in sixty years have greatly advanced and

improved. Though starting out hand in hand their relations are now changed. Commerce has stepped in and separated them, and offers to each the opportunity of buying and selling in the best markets without regard to each other. The manufacturer employs the merchant to buy and to sell; the farmer, except in a small way, does the same. If the manufacturer goes abroad for wool, so the American cheese farmer has become enabled to excel the English and Dutch, and to beat them in their own markets and on their own ground. The Kentucky stock breeder sends improved Durhams back to England. The greatly improved and extended system of transportation has broken up monopolies and equalized prices. It has brought the cheap lands of the West in competition with the higher-priced lands of the Eastern States. It has brought the comparatively cheap lands of the interior into competition with the more costly lands lying near large cities. The difference in the cost of production being greater than the charge of transportation, it follows that you cannot compete with those who produce cheaper than you do. Hence New England farmers can no longer profitably grow wool, or beef, or pork, or wheat for the manufacture of flour. But they can safely raise grass and hay, rye, oats and buckwheat, potatoes, and perhaps corn, milk, butter and cheese, poultry, mutton and veal, a variety of vegetables, and some species of fruit.

The Western farmer, on his cheap but fertile lands, will raise wheat and corn, beef and pork and fruit with less capital and less cost of labor than you can in New England. He can live cheaper, and the laboring man can buy more food with his wages than he can in New England. But the Western farmer has a great many trials and drawbacks. He is often remote from all the comforts of civilized life. In a country that is sparsely populated, he is sometimes without a market for his produce. He at times struggles with poverty and sickness, and his family are sometimes beyond the reach of schools and churches. There are many exceptional cases. I have known corn consumed for fuel. I have myself seen a wheat crop entirely consumed by the cost of threshing alone. I have known corn abandoned to the tenant because its value in market was not equal to the cost of transportation. I have seen whole fields of corn and wheat standing through the winter

unharvested, either because its value was not equal to the cost of harvesting, or because of sickness or impossibility of procuring labor.

On the other hand I have known cases where the net profits of the first crop of wheat paid the purchase money of the land. I have again seen wheat sell for twenty-five cents per bushel, and flour for three dollars per barrel, and cured bacon in the hands of the merchant at two and a half cents per pound; of course the producer lost his labor. Again I have known wheat produced at the rate of thirty bushels to the acre, selling at a net profit of two dollars the bushel. Many a poor farmer, on the contrary, I have known to be sold out under a mortgage foreclosure for purchase money, and I have seen the largest farmer in the Western States go into bankruptcy. These are some of the exceptions, but there is no sort of doubt that the fluctuations of fortune are much greater among the farming population of the West than among the same class in New England.

NEW ENGLAND FARMERS NOT TO BE DISCOURAGED.

I have therefore to say to you, if you have a soil whose native fertility has apparently long since been exhausted by several generations of cropping, and though you have long and severe winters, be not discouraged. You have not so much arable soil in proportion to area, but what you have contains more latent qualities of fertility, probably, than the soils of the West. The average yield of farm products per acre, both in quantity and value, of New England farms, actually exceeds those of the Western States, excepting only the virgin States of Kansas and Nebraska. The average yield of wheat per acre in New England exceeds that of all the Western States taken together, including Kansas and Nebraska. Take all the States of the Union together, and as compared with them, the average yield per acre of New England farms is in still greater excess. The Southern States grow cotton and some of them rice and sugar; but except in the northern parts, and in portions of Texas, they can't grow corn, or wheat, or grass. They thought cotton was king because it entered largely into foreign exchange. But the butter crop of the Empire State of New York in 1865, was twice as valuable as the cotton crop of the Empire State of

Georgia in 1860—being sixty millions to thirty. These facts may surprise you, if your attention has not been paid to them, and more than you, the people of the West. You will find them revealed in the statistics gathered at Washington, and my own experience and observation have tended to confirm their truth. In average value still more, your yield per acre and per hand engaged in agriculture exceeds that of all other sections of the Union.* This is owing to your proximity to the largest and best markets created by manufactures and large cities, and the fact that your agricultural population is less in proportion to the whole number of people, than the agricultural population of the Western States is to their whole number. It is said that your agricultural population is diminishing. This may be so. The tendency of improved machinery is to lessen the number of laborers employed in a given section, and to encourage those who have capital to undertake larger farms. The aggregate production is doubtless increasing, though not in New England, simply from the increase of cultivated area. The time is coming, however, when the result will depend not so much on area, as on the acreable capital engaged in agriculture. Now though your cultivation may be better than in many of the States, yet it is very far from developing fully the capabilities of your soil. And as you are above many others, so are the Lothians, in Scotland, superior to you in agriculture, and to all other people in Europe. I commend you to their example.

* The following table deduced from the results of the four years 1862-3-4 and 5, shows the average value of corn and wheat in the seven States named, and at the same time suggests to Western farmers the serious effects of costly transportation, and hints to them the necessity of a home market:—

STATES.	Value of Corn per acre.	Value of Wheat.
Vermont,	$48 80	$29 03
New Jersey,	37 30	28 25
Maryland,	24 19	21 73
Ohio,	20 20	16 25
Indiana,	17 96	16 30
Illinois,	14 47	14 36
Iowa,	19 59	12 85

Average Wages per Month of Farm Laborers.—Eastern States, $33.30; Middle States, $30.07; Western States, $28.91; Southern States, $16.

IMPROVEMENT IN MACHINERY.

The improvement in agricultural machines and implements has increased the mechanical powers of production to an incalculable extent. It has saved labor, and at the same time become the equivalent of an enormous increase of hands and crops; it has elevated and improved the moral and intellectual condition of the farmer, and largely enhanced the public wealth. I can remember when it was deemed impossible to mow your meadows by the hand-scythe without the incessant backing up of rum and whiskey, and even a common hog killing, or husking bee, could not be conducted without that inevitable mixed beverage of beer, spirits and sugar, stirred with a red-hot iron, called *flip*. Improved machinery, therefore, has been the handmaid of temperance.

EFFECT OF THE LATE WAR.

The stimulus given to production by the late civil war, causing high prices, induced such an increase in the manufacture of agricultural machinery and implements as to more than fill the place of the million of men drawn into the ranks of the army. And the consequence was that this nation exhibited an example, such as has never been seen in all history, of a people supporting a consuming army of a million in the field of war, yet not only filling the gap, but actually so increasing their domestic products as to create a larger surplus for exportation than ever before. As compared with 1860 and the years previous, these exports, excepting cotton only, were actually doubled during the war, and thus our agriculture not only supplied food for the masses of the people and for the army and navy, but gold for the public treasury. What a proud monument is that to the skill of our mechanics and the enterprise of our farmers. Though their swords were ploughshares and their spears were pruning hooks, what soldier with musket, sword or cannon, performed a more effective service for his country? For who can say that but for this wonderful spirit aroused and developed in agriculture, our soldiers could not have been sustained, and the war might have been a failure.

AGRICULTURE, MECHANICAL AND CHEMICAL—BETTER FARMING NECESSARY.

The whole of agriculture consists of two classes of operations. One is purely mechanical, and the other is purely chemical. And inasmuch as the mechanical process is simply intended to enable a chemical effect to be produced, agriculture may be said to be the business of producing food by a chemical process. In the new States, where artificial fertilization is never resorted to, agricultural operations are merely mechanical. They plough and sow, reap and thresh, and sell the product, and that is all of it; and this is continued until the virgin fertility of the soil fails, that is to say, until the alkalies are exhausted, and then they move to a new field. But this process must have an end. It is rapidly approaching.

Look at wheat culture. The seat of it is still travelling west. It has been gradually removing from the Genesee Valley westward, until it has reached Minnesota and Nebraska. In Illinois, which has been called the Garden State of the West, the production has already fallen to an average of thirteen bushels to the acre. But in Illinois every other person has a horse, while in Massachusetts there is only one horse for every twelve persons. The prairie soils are rich in vegetable mould, but are much lighter than the gravelly soils of New England; which have more mineral elements, and are probably therefore more durable and better resist drouth. There will be a reaction, and high farming, requiring more knowledge and intelligence, must become the order of the day, as a remedy for the wasted fertility of the virgin soils of the country. What then? Look at the farmers of England, Scotland, Belgium and Holland; see how they make the average crop per acre, upon lands which have been cropped for hundreds of years, double that of the lands of the New World. We shall then say, perhaps, that what has been, can and must be, again. We shall then look a little deeper and more soberly into the mysteries of agriculture than ever. It may become a question in a large part of the country, as it has already in New England, How shall we grow food enough to sustain the population? We shall have to study and reflect. We shall have to consider the physical condition of the soil, and take it up and analyze it, and ascertain what are its

constituent elements. We shall have to examine the plants we would grow in it, in the same way, and learn of what they are composed. Then we must make such combinations and applications as will "tickle the earth and make it laugh with a harvest."

"What do you mix your colors with?" inquired one poor artist of a more successful brother. "Brains," said he. And that is the very article we shall very much need in all our future operations in the high art of agriculture.

ENGLISH EXPERIMENTS.

There are several private gentlemen in England, fortunately possessed of means and disposition, who are making experiments in the interest of agriculture, which are worthy your attention.*

I refer to the experiments of Mr. Laws of Rothamsted, which have been conducted at his own cost for seventeen years, and developed results of great interest and value. They have upset one notion which we thought was established, viz.: that a crop grown year after year in the same place would diminish gradually, and finally run out. He has grown wheat seventeen years upon the same plat of ground without manure, the report says "unmanured," and produced from it an average of $14\frac{3}{4}$ bushels per acre,—a larger average than the wheat crop of the Western States. The largest average production was $36\frac{1}{2}$ bushels per acre, and this not from the use of any single fertilizer, but from several in combination, of which the principal ingredient was nitrate of soda. This article was found to be of especial benefit to grass, more than trebling the product—increasing it from one to three tons per acre. The soil, it should be observed, at this place is a "somewhat heavy loam, with a subsoil of raw yellowish red clay, but resting in its turn upon chalk, which produces good natural drainage." The tabulated results of these experiments are very voluminous, and while we cannot of course deduce from them any certain rules that will be applicable to all farms, yet they must stand as a fruitful source of practical information. The results are briefly and beautifully exhibited with reference to wheat, on a tablet now standing against one of the walls of the new building devoted to agricul-

* See table on next page.

Experiments with different Manures on permanent Meadow Land, made in the Park of JOHN B. LAWS, *Rothamsted, Hertfordshire.*

The land has been probably laid down with grass for some centuries. No fresh seed has been artificially sown within the last thirty years certainly, nor is there record of any having been sown since the grass was first laid down. The experiments commenced in 1856, at which time the character of the herbage appeared uniform over all the plots. The same description of manure has been applied year after year to the same plot.

SUMMARY ABSTRACT.—Examples of the domination of the plants of one natural order over those of another in the mixed herbage of grass land, 1867, 12th season, with the same manures:—

Plot.	MANURES.	NUMBER OF SPECIES.							WEIGHTS PER CENT.							HAY PER ACRE, CWTS.	
		Graminaceæ.	Leguminosæ.	Ranunculaceæ.	Umbelliferæ.	Compositæ.	Other Orders.	Total.	Graminaceæ.	Leguminosæ.	Ranunculaceæ.	Umbelliferæ.	Compositæ.	Other Orders.	Total.	1867.	Av'ge of 12 yrs.*
3,	Unmanured,	17	4	3	2	7	20	53	62.27	8.07	2.05	6.50	2.82	18.29	100	20⅜	23¼
7,	Mixed mineral manure alone,	17	4	3	3	6	10	43	59.29	12.69	0.50	10.64	4.99	11.89	100	39¾	34⅜
5,	Ammonia salts alone (82 lbs. nitrogen per acre),	16	4	3	2	3	9	37	71.85	0.31	0.10	6.51	3.53	17.67	100	29½	30
9,	Ammonia salts (82 lbs. nitrogen per acre), and mixed mineral manure,	15	2	2	2	2	7	30	77.06	0.16	0.05	9.36	2.04	11.33	100	48	52¼
11,	Ammonia salts (164 lbs. nitrogen per acre), and mixed mineral manure,	13	1	–	1	1	2	18	94.12	0.01	–	1.84	0.06	3.97	100	47¾	61¼
15,	Nitrate of soda alone (82 lbs. nitrogen per acre), 10th season,	17	4	3	2	5	8	39	80.02	0.51	0.61	0.29	1.45	17.09	100	47¼	37¾†
14,	Nit. of soda (82 lbs. nitrogen per acre), and mixed min. manure, 10th season,	14	3	3	3	3	4	30	94.25	0.39	0.40	3.11	0.71	1.14	100	64¼	51¾†

* 1856-1867.

† Average of ten years only, 1858-1867.

ture at Washington, showing the entire plant, straw and head, as it matured on the different plots of ground, under a memorandum of the course pursued for each specimen.

The other case to which I refer is that of a gentleman near London, who formerly lived in Canada, who is completely upsetting the old idea that we can't farm without animals. "No corn, no cattle,—no cattle, no manure," &c. This gentleman bought a tract of clay land, which seemed to be virtually abandoned for any agricultural purpose. He then employed a chemist, and analyzed the soil, discovered its qualities and its deficiencies—analyzed the plants he designed to grow—saw what they required, determined on his crops, and went to work. He procured Fowler's machinery for ploughing by steam, and with that he ploughed the land deeply and thoroughly, and harrowed it also by steam. His chemist then prepared such fertilizers or solvents, or plant-food if you choose, in London, as were suited to his wants, and he put in his crops. His success is reported to be remarkable. When his crops were ripe, instead of gathering them and putting them in barns, and feeding them to cattle, he simply sold them at auction as they were standing on the ground. The purchasers harvested them and took them away. Thus this proprietor goes on ploughing and planting and applying his artificial fertilizers and selling the standing crop; his two principal workers being an engineer and a chemist. No animals to work and none to feed. This farm being near a good market, where the crops bring good prices, the method, it is said, is proving very profitable.

A FRENCH METHOD.

A scientific gentleman in France, Professor Ville, has, for over ten years, been pursuing a course of experiments nearly the reverse of that taken by the chemists generally. It is somewhat like the natural method of farmers. He studies the appetites of plants, but more especially the three great families of plants upon which agriculture mainly depends, viz.: the cereals, the leguminous plants, and roots, and he has deduced from his study the formula of a normal manure. His method is synthetic. He seeks to build up a plant, and he maintains that he can do it in any soil. His process was to take clean sand, calcined, and, by the aid of fertilizers chemically prepared, make

his plant grow perfectly. His long series of experiments, at first carried on by himself at the Jardin des Plantes, in Paris, and afterwards under the patronage of the Emperor Louis Napoleon, on the imperial farm at Vincennes, has led him to infer that the aliment preferred by cereals is *nitrogen;* by leguminous plants *potassa;* by roots, the *phosphates;* to all of which he adds *lime*, with such proportion of humus as will render the lime acceptable to the plant. He gives a formula of the proper quantities of these various substances to be used in growing the crops, and defines the state in which they are to be used. He publishes the results of his practice, and furnishes tables, which I can only refer to as of great interest. The practical result is, in one respect, similar to that of the experiments near London, viz.: that animals are not at all necessary, so far as manure is concerned. You will find the whole system developed in Prof. Ville's "Six Lectures on Agriculture." Such experiments as these I have referred to should be continued at our agricultural colleges, and other scientific institutions, and as far as possible by practical farmers, and we must expect great reforms, even from the application of the results thus far obtained.

MUCH KNOWLEDGE NEEDED.

It is becoming very evident that whatever may have been the character of farmers heretofore, the present advanced state and further requirements of the art of agriculture, demand intelligence, close observation, good sense, learning; in short, science. To be a successful farmer in these times a man needs to be a mechanic and a chemist. He needs knowledge of physiology and geology. He should have knowledge of natural history, botany, veterinary medicine and surgery, book-keeping, arithmetic and surveying. It will not do hereafter to say of the dullest boy in the family that he can be a farmer, because he is unfit for anything else. He must have all the elements of an earnest man in him, with good reasoning and analytical powers, and no slow blood, or indurated brain, or else, though he might make a poor lawyer, doctor or politician, it is not at all probable he will succeed as a farmer. Why, the science of agriculture, in its highest sense, requires more knowledge, based on a large part of the physical sciences, while it requires as much literary education to understand, as any of the other professions. In-

deed, it is more difficult of complete acquirement and mastery than either of the others. Immutable laws, it is true, he will find in the great book of nature, which the Almighty has spread before him; but he plainly sees it is full of mysteries, and the laws applicable to ever-varying circumstances and combinations difficult to reconcile or adjust suitably, and requiring sharp apprehension and perpetual study and effort.

MORE EXPERIMENTS WANTED—EDUCATION OF FARMERS.

We want more exact methods. We want more of such experiments as those at Rothamsted, in which all the circumstances are minutely and scientifically detailed. We want more and better education in the exact and technical sciences. The agricultural colleges which have been lately established in several parts of the country, may be the means of affording a suitable education to the sons of farmers if they should be properly conducted. But if they should not be, then it is a fortunate circumstance that nearly all the colleges of the country have placed a scientific course of study at the option of their students. At the several schools of mines and technological and polytechnic institutes of comparatively recent establishment, the desired education may be obtained. Then, when our farmers' sons have acquired a knowledge of the general principles of nature, and learnt how to conduct scientific investigations, and sensible and persistent experiments in the field, as well as how to manage the general machinery of farming, we may expect to see them achieve a greater success than their fathers, enforce a higher respect to themselves, and endow their pursuit with a nobler dignity.

> "Dispel these clouds, the light of heaven restore,
> Give me to see, and Ajax asks no more."

PUZZLING QUESTIONS—MINERAL MANURES.

If you will pardon me, and not adjudge my words to be the foolishness of books, I will take the liberty to mention one or two things which will serve to indicate a little of the interest there is in science as applied to agriculture. Did you ever observe that vegetation was most flourishing during a season noted for thunder storms? One chemist (Liebig) attributes the effect to a fall of nitric acid in the rain (nitric acid means *aqua-for-*

tis); another attributes it to ammonia; another to electricity. This same nitric acid combined with common salt, forming nitrate of soda, is proven, in the experiments I have mentioned, to have a special effect on grass. Why? And this nitrate of soda is found in large bodies in Utah, and in South America, and on the Continent of Europe. Why does gypsum or plaster (sulphate of lime) produce such marked effects on clover on some soils, and very little effect on others? How does it operate? No two out of five chemists will probably agree on that. Why is it that lime will cure the acidity of soils, and kill sorrel, moss and dock? Why is it that an ox can thrive on straw, and his owner only on the grain? An Englishman and a Scotchman met, and the Englishman remarked that the food (oatmeal) the people ate in Scotland was only consumed by horses in England. "That is the very reason," replied the Scotchman, "why they have such fine horses in England and such superior men in Scotland!" Why should oats develop muscle, and corn produce fat? Why is it that some plants cannot live as the successors of certain others in the same spot? Have plants the power of excretion? By what sort of function is it that plants can emit volatile substances and very sensibly affect our olfactory nerves? Have plants the power, like animals, of selecting and rejecting food placed within their reach in the soil? When the sun shines, chemists say, plants absorb carbonic acid from the air, give off oxygen and grow green; and that during the night, or in a dark place, they absorb oxygen, emit carbonic acid, and grow white. Why? And there is ammonia, one of the most wonderful agents employed in the laboratory of the farm. You see ammonia salts mixed with mineral manures more than doubled the crops at Rothamsted. Perhaps some lady present has a bottle of it in her pocket, applying it to her olfactories occasionally, under the name of hartshorn. This powerful agent, it is said, is composed of hydrogen and nitrogen, and arises from the millions of decaying dead animals. It comes down in every fall of rain, snow and hail. It is abundant about horse stables, barn-yards and slaughter-houses. It, like the busy bee, is at work at every plant, aiding it in assimilation, painting its flowers with red and blue, and building up its organic elements. It is the principal constituent of guano. It is so volatile that it is scarcely appreciable by the most delicate

eudiometer. If one farmer is so fortunate as to live near a neighbor who keeps his manure in a heap out of doors, he will be likely to get more benefit from it than the owner, particularly if he has a growing crop and the wind sets in the right direction, and the owner after a while will find that the most valuable part of his compost heap has escaped by dispersion through the atmosphere. He might have caught the runaway and held it for the use of his own plants, if he had covered it with gypsum, charcoal or peat. Chemistry can crystallize it, and mechanics can make use of it in driving machinery.

Would it not be wonderful if ammonia should prove to be not only the great chemical agent, but the motive power of the farm? As for letting it lie out of doors, in the weather, in a heap of manure, a man might as well leave his purse in the street. As all soils originated from the disintegration of rocks, you may reasonably infer that a mountainous region like this, full of rocks, contains very many, if not all the mineral manures you need. How are you to avail yourselves of them? Many a farmer lives, works hard, and dies poor, never knowing or dreaming that latent powers of rich production were all the time lying just beneath the surface of his farm. The beautiful Neapolitan hats are made of straw glazed in its growth by fertilizers belched from the bowels of the earth by volcanic Vesuvius. A purely vegetable soil, when exhausted of alkalies and mineral ingredients, will neither give strength to the straw nor body to the grain. The plant may become an herb, but bears no fruit and droops prematurely.

The lightning once struck a stack of hay in Germany, and left only a vitreous mass which the people took to be a meteoric stone. It proved to be the melted ashes of the hay, converted into solidified silicate of potash. Thus you get a hint of what it is you are carrying off from your meadows in the hay harvest, and what it is that irrigation probably restores to them.

EXAMPLE OF DUTCH AND SWISS FARMING.

A few years ago, standing at the top of the tower of the great church of Rotterdam, I counted one hundred and forty-five windmills in sight, and these were but a small part of the number engaged in pumping out the water to drain the flat farming lands of Holland. At an enormous expense they had diked out

the sea and confined the rivers, made canals, and were incessantly pumping to keep out the water. Just think of the difficulties the Dutch encountered and overcame to carry their farming to such a high degree of prosperity as it has attained. Hence come the Dutch breed of cattle. Look at the small farms in Switzerland. Their mountains are higher, nearer and more precipitous than those of New England, and ice and snow perpetually crowning the mountain tops, suggest summer and winter at the same time. Yet their little meadows are very productive; herds of fine cattle graze upon the mountain sides, and their butter and cheese made at their little chalets or cheese houses high up in the hills, are famous. I have seen the Swiss farmer distributing liquid manure with a long-handled dipper; and sometimes transporting up the steep hillsides his barnyard manure in a basket on his back. His oxen bear the yoke on the forehead, and his cows are often harnessed like a horse. Look at Assyria, once a great empire. The plough sculptured on the stones of ruined Nineveh is the same as yet used in the adjacent country. The furrow is turned and the seed covered at Aleppo at this day just as they were in the days of Job and Amos. The plough of modern Mexico, Spain and Italy, is very little improvement upon that of ancient Rome. Considering what an inefficient instrument it was, it is not to be wondered that some of the Latin authorities thought the best thing to be done in agriculture was to keep the plough going. Mixing soils is equivalent to manuring, said Theophrastus.

"Quid est agrum bene colere?" asked Cato.
"Bene arare." "Quid secundum?" "Arare."
"Quid tertium?" "Stercorare."

And this is not far from the main philosophy of it at the present time.

CONGRATULATIONS AND HOPES.

A retrospective view of the progress of the last sixty years reasonably entitles us to congratulate ourselves upon the great advance that has been made. The improvements in the plough, in the drill, in the hay and grain cutters and harvesters, and threshing machines; in the steam-engine for work or transit; in the combination, manufacture and use of fertilizers; in husking, shelling, grinding, churning, baking, cooking, and in sewing,

sawing, planing, morticing, boring; the development of better horses, cattle, sheep, swine, poultry, and grain and fruit, together with the wonderful discoveries in applied science, have placed the present generation on an eminence far higher than any attained by the ancients, or by our own immediate ancestors. In respect to many of these improvements we may justly claim that America excels all other countries on the globe. Political liberty has proven in the highest degree favorable to the development of ingenuity and boldness in invention, and in rendering human labor more productive, and consequently in securing for it better pay in this country than in any other. To these improvements there is no end. The true farmer is still rising. He is to become a renovator, and not continue an exhauster. Wider knowledge and improved motive powers are coming to him to increase his efficiency, and to place him on a still higher platform of prosperity and dignity. Let the older farmers take and read the journals and behold the progress. Let the young men be educated and prepared for the new fields that are rapidly opening. Let the motto be: "Intelligent labor is the most successful labor." Upon the farm then will dwell the true nobility. The mind imbued with all useful knowledge of the principles of nature, the man a fixture upon the domain he owns and masters, order and stability must necessarily be the foundations of his kingdom and his hopes. The farmer's example of industry, intelligence, peace, contentment, integrity and domestic independence, health, happiness and longevity, will exert a great moral power in checking the tendencies to fall into the corruptions of luxury and government. So far as his influence extends he would inspire faith and confidence in the future, and give to true liberty a sure anchor, and to our glorious country a solid base of support for its unprecedented growth in wealth, power and grandeur.

PROGRESSIVE FARMING.

From an Address before the Essex Agricultural Society.

BY JOSEPH S. HOWE.

One of the chief hindrances to agricultural progress is the reluctance farmers feel towards giving the public the benefit of their experience, either by writing or by speech. There are men before me to-day, whose locks have whitened in the sun and wind and toil of the farm,—men shrewd, observing and practical, who have wrung from the soil all they possess of worldly wealth,—men competent to teach many of those who attempt to instruct us, but who are only unwilling to make the attempt. Could we obtain a record of the experience and practice of these men the result would be invaluable.

Although tilling the soil has been one of the chief occupations of the race ever since our first parents were driven from the Garden, yet almost the whole field of practical agriculture is debatable ground. There is comparatively little absolutely *known* of the mysterious processes of growth daily going on before our eyes, and men of equal judgment and experience differ widely in their theories.

The census returns show that the relative number of farmers is diminishing, especially in the New England States, and that the tendency of population is to gather into cities. Whether this apparent decline in agriculture is because the culture of land pays less return, or because improved implements have taken the place of manual labor, or whether the decline is *only apparent*, is a problem difficult of solution. It is certain that the demand for all the varied products of the soil is greater than ever, and consumers are slow to believe that the prices they pay are not sufficiently high. At the same time some of us fail to see the substantial, tangible evidence that our business is profitable. I have thought, therefore, that we might well occupy the

time allotted to this address in considering the general plan of management which an Essex County farmer should adopt, and also some of the difficulties he will meet in the prosecution of his business.

In the first place we must recognize the fact that our agriculture, especially that of Eastern Massachusetts, is in a transition state, and adapt our business to the wants of the times. The best method for the practice of thirty years ago fails now to yield any profit. The better facilities for transporting produce, the high price of labor, the greater cost of living and high taxes, all combine to render it almost impossible for the farm in Eastern New England to pay a profit under the old system of culture. The increased price of the great agricultural staples does not keep pace with the increased cost of production. The rich lands of the West can and will furnish us with these articles at prices ruinous to an Eastern farmer. So long as the Western farmers can pursue their present course of impoverishing the soil by continual cropping, just so long it is idle for the Eastern farmer to attempt to compete with them. Our soil, originally far less productive than theirs, has already undergone that process, and we must restore in some measure the exhausted elements of fertility before we can expect large returns.

The cost of cultivation is the principal item of expense that enters into the calculations of a Western farmer, while here the manure and labor necessary to its application form the heaviest charge. The facilities which steam has furnished for cheap and rapid transportation, bringing the products of South and West to our very doors, has wrought a change in the condition of New England agriculture, whose magnitude we cannot yet estimate. The old opinion that the farmer should produce everything that he consumes, and the kindred notion that he should consume as far as possible everything that he produces, are exploded, and he finds he must adopt the free-trade principle of producing those commodities which yield him the most profit, which his circumstances best fit him to produce, and supply his remaining wants from other sources.

If we can raise onions, squashes, carrots or cabbages, or any other product, and with this product buy twice as much corn as we can obtain on the same ground with a like expenditure, it is clearly poor economy to raise corn.

If we expect to make our business profitable, we must turn our attention to those crops which are required by our local markets,—crops which are perishable, or difficult or expensive to transport for long distances. We, farmers of Essex, are peculiarly situated. Encircled by a belt of large manufacturing towns and cities affording an abundant supply of fertilizing matter, and a ready market for every product, with Boston and its surrounding cities within easy reach of every town in the county, our choice of the crops we will grow is only limited by conditions of soil and climate. Here is a field for enterprise that a farmer a hundred miles from market, and away from a railroad, knows nothing about. He must do as our fathers did,—produce such articles as can be transported a long distance without injury, which do not involve too great an expense in carriage, and which do not need to be used at once. We can disregard all these conditions.

The practical considerations which should govern the farmer in his choice of crops are many, and vary with the surroundings of each individual. Hay is, and must continue to be, unquestionably, the leading crop for all, except those engaged exclusively in market gardening and horticulture. The small amount of labor necessary to its production, our nearness to a market, and, above all, the fact that only a small portion of our cultivated land can be used at once in the production of hoed crops, without expending more labor, manure and capital than most of us can employ, combine to make this crop the most important to an Essex County farmer. It is safe to say that most farms should be managed with special reference to the production of grass. And I mean by this, that the expenditure of fertilizers and rotation of crops should always have reference to the crops of grass which are to follow.

Some cultivate the same lot of ground year after year with a succession of hoed crops, meanwhile doing little or nothing to their grass lands. If, instead of this, the different parts of the farm should be successively cultivated, and then sowed with grass, the total income would be greater.

The census returns give the average yield of hay for the State of Massachusetts at a trifle less than a ton per acre. Perhaps the average for this county is somewhat larger, but yet is far below what the soil is capable of producing. The culture of grass is

as yet very imperfectly understood. The time and manner of sowing,—the kind of seed and amount per acre,—the time of cutting and mode of curing,—the effect of fall feeding,—the most economical kind of top-dressing, and the time of applying it, are all disputed questions. Probably no rule can be laid down which will be equally applicable to each individual case.

There is no time of year which will invariably turn out to be the best for sowing. But I believe the opinion of the best farmers seems to be that, on the whole, there is less risk of failure if sown in early fall or early spring, and with no other crop. Too much care cannot be taken to secure a good "catch," because the future prosperity of the crop depends largely on a thorough stocking of the ground with plants. It is a "penny wise and pound foolish" policy to run the risk of injuring the young grass for the purpose of obtaining a little larger income the first season.

If land is moist and thoroughly stocked, it may be kept in good condition for several years by a judicious top-dressing. But my own experience is that top-dressing cannot be applied to high lands with so good a result. Manage as we may, in from three to five years the crop grows less, the wild grass begins to creep in, and from five to eight years the land needs turning over and re-seeding.

Having started with the idea that grass must be the principal crop, a regular system of culture should be adopted. A portion of the "bound out" land should be ploughed up every year, and as near as may be a like part of the land annually laid down with grass; and we ought to proportion the quantity ploughed each season so that the whole tillage land can be cultivated by the time the grass becomes so much bound out as to need re-seeding. And here let me suggest that many of us would obtain a larger product at a less expense, if the labor and manure were concentrated on a smaller space of ground. I do not believe with some that what is called "high farming" is the great panacea for all the "ills that agricultural flesh is heir to." It would have been absurd to recommend the "old country" system of agriculture to the Pilgrim Fathers, with all the wilderness before them, just as it would now be absurd to advise a settler in a valley of the Rocky Mountains to adopt the high-culture system of Japan or Belgium. When land is plenty and

cheap, and markets poor, it does not pay the farmer to cultivate highly. He can obtain an equal amount of produce easier and cheaper by cropping his land, and when it is exhausted, shifting his operations to "fresh fields and pastures new."

The more thickly settled the country, and the greater the demand for agricultural products, the more thorough the system of farming that will be most profitable. It is doubtful if the high-culture system of Belgium would be profitable for us, even if practicable to adopt it; still I think it is time for us to take a long step in advance. It is impossible to lay down a rule which will be equally applicable to every one, for we are all more or less limited in the amount of available fertilizers.

But I think it is safe to say that if we have more land under cultivation than can be kept increasing in productiveness, it would be more profitable to turn a portion of it to pasture and cultivate less. In other words, if we find the tillage land of our farms is not annually increasing in fertility, economy requires us to increase the manure or diminish the extent of land cultivated.

Another point of importance is to so manage that the land cultivated each year should lie as much as possible together. Many farmers pay no attention to this, and cultivate hoed crops at parts of the farm remote from each other. The time lost in passing from one lot to another in the course of the year, and in moving teams and tools, amounts to quite an item, especially where a large force of labor is employed.

I have stated the opinion that the most profitable culture of grass requires that as often as once in four to eight years much of our land should be thoroughly enriched and cultivated with some kind of hoed crops. What these crops shall be depends upon a great variety of circumstances. I believe it is sound doctrine that, as a general rule, no hoed crop should be raised which, with average success, cannot reasonably be expected to pay the expenses of labor and fertilizers employed in its production and leave the land in better condition. We must also be careful to select such products as our land is adapted to produce. This can only be ascertained by actual trial, at the same time taking care to avoid the mistake of going into the culture of any fruit or vegetable too largely at first. Success in the cultivation of any crop, like the practice of any trade, requires a

minute knowledge of all the details, which can only be gained by experience. If, therefore, the farmer proposes to undertake the cultivation of any new crop, the best plan is to begin in a small way, keeping a record of the time of planting, quantity and variety of seed, with other details of management, each year observing the results and increasing the amount of land devoted to its culture as may be found expedient.

Another consideration in the choice of crops is the character of the market to be supplied, its accessibility and wants. It is a well-known truth that the increased supply of any article enlarges the demand. Many products which a few years ago were considered as a luxury which only the rich could afford, are constantly used by the day laborers in our cities and villages. Twenty years ago a half acre of strawberries would glut any market in the county, and this delicious fruit was entirely unknown in the smaller village markets. Now there is scarcely a family which does not consume more or less, and their production is becoming a leading branch of horticulture. And so of other things. Supply the market with a really good fruit or vegetable, and the public will learn to use it.

Another important consideration affecting the choice of a crop is the size of the farm and facilities for obtaining labor for extra purposes. Most of us are so situated that we cannot readily increase our labor force very much in any emergency; hence we find it most judicious to employ a certain uniform number of men for the season. It becomes of importance then, that the general plan of management for the year should be so adapted to the force employed that there may always be enough to do, and yet that nothing may suffer. Unless the labor force can be increased at pleasure, economy of management requires that such crops should be planted, and at such times that their management will not interfere one with the other. Here arises the greatest difficulty in raising strawberries and other small fruits, as well as early vegtables, on farms which produce large quantities of hay. The small fruits *must* be marketed in their season, and this is mainly at a time when hoeing and haying both need attention.

One of the chief difficulties in raising roots largely I have found to be the fact that they generally need hoeing and weed-

ing during the early part of July, when they are pretty sure to be neglected, and if neglected too long, ruined.

Another point worth considering in the selection of a crop, is the use that can be made of it providing it cannot be readily sold.

Articles of good keeping qualities will usually find a market somewhere, but some of the most profitable kinds of produce are perishable, and must be disposed of in some way at once.

It is a good point in any product that it is worth something to feed to stock, providing there is no sale for it in the market. If, for instance, we raise turnips or cabbages, and by reason of a large crop the price is so reduced that they hardly pay for marketing, they are worth what it costs to raise them to feed to cattle. If, on the other hand, we happen to have a surplus of onions, tomatoes, or cucumbers, we must encounter loss, because these articles have little or no value, except as food for man. Did time permit, many other points might be mentioned, having a bearing on the selection of crops.

But after all, nothing can be raised which will invariably prove profitable under the most excellent management. The best rule seems to be to select a few specialties, and make their cultivation a study. It is poor policy to change continually from one thing to another, or to attempt to produce many commodities at once. If we decide to raise potatoes as a market crop, the fact that potatoes are too cheap to pay well this year is not a good reason why we should not plant our usual breadth of land in potatoes next spring. Those farmers who thought they had discovered in the Early Rose the philosopher's stone wherewith to transmute the baser elements of the soil to gold, will have discovered their mistake, and next year will plant something else, perhaps the Trophy tomato or Norway oats.

The place which stock should occupy in the best system of farming, is another unsettled question. An abundant supply of fertilizing matter is a prime requisite for successful farming; and whether it is more profitable to sell produce and buy manure, or feed the products of the farm to stock, depends upon the nearness to market and facilities for obtaining dressing for the land.

It needs no demonstration to show that raising the common kind of stock, such as is found in the great markets, will not

pay in Essex County. A four-weeks-old calf generally sells for about as much money as an average yearling.

The fact that but little stock is raised in the county, and that usually from favorite or superior animals, shows that farmers do not find it for their interest to pursue this branch of husbandry. Neither can cattle be bought and fatted with profit, as they could before the modern facilities of transportation from the West.

The dairy is, and must be, the only branch of stock farming which will prove profitable in this section of New England. The production of milk for market is fast becoming a leading business, and the large proportion of population who depend upon the farmer for a supply of milk, will make this a principal department of husbandry in the future. There is a mistaken idea abroad concerning the profit of this branch of farming. If we reckon milk at the wholesale price, and take into account the market value of the provender and the average quality of cows kept for this purpose, we shall probably find the actual profits of producing milk extremely small. This department of farming has engaged my attention for some years, and I find the annual results average very nearly the same.

I have usually kept a herd of from sixteen to twenty or more cows, and have endeavored to procure as good a quality of stock as could be obtained with reasonable effort, and to feed as highly as farmers usually consider judicious. The result has been, that the cows have yielded on an average from twenty to twenty-two hundred quarts of milk annually; varying with the quality of pasturing and freedom from accident to the stock. The average quantity of milk annually produced by cows throughout the country is estimated, I believe, at less than eighteen hundred quarts, and it is probably safe to estimate the average quantity of milk obtained from the cows of Essex County at not far from two thousand quarts per year.

The average wholesale price of milk is about four and a half cents per quart, making the average annual income of cows from ninety to one hundred dollars. To offset this, we must reckon the value of about two tons of hay, pasturing, a supply of green fodder in the fall, and ten or twenty dollars' worth of grain, to say nothing of labor and interest on capital.

Now to show what is *possible*, I will give the result of observations made a year or two since for the purpose of ascertaining the difference in income from different cows. I selected three cows from my herd, one of which had been kept upon the place several seasons and was thought to be fully an average cow; the other two were superior. The quantity of milk produced by each was carefully noted each week for a year. The result showed, that while the average cow produced only twenty-one hundred quarts per year, one of the others produced thirty-one hundred and the other thirty-five hundred quarts, in the same time There was no perceptible difference in the cost of keeping. Now if one could obtain a stock of dairy cows which would produce three thousand quarts per year, milk could be furnished the consumer at a less price and a good profit to the producer. Any farmer who can procure a herd of such cows can make money with them.

There is no doubt but that the production of stock of a quality equal to this, is entirely within the range of possibility. The practical question is, How shall we get such animals? And this I regard as the most important point for every farmer who intends to make milk-raising a prominent part of his business. In the present condition of stock-breeding, it is impracticable for him to go into the market and purchase them, because such cattle are the exception, and those who own them do not often offer them for sale. The only way in which we can improve our milk stock seems to be to raise it ourselves, and perhaps the greater value of such animals will pay for doing it.

These are some of the points which an enterprising farmer must consider, and decide, if he expects to meet with success in his calling. But after he has decided on the most judicious plan of management for his peculiar circumstances, he will find new difficulties confronting him. Our hard lands of New England will not produce paying crops without a constant and large application of fertilizers. The source from which they shall be drawn will be to him a never ending perplexity.

The two principal sources of supply are stable and commercial manures. Our proximity to large towns enables many of the farmers of this county to obtain the former, and where this is practicable there is nothing which can supply its place. It is idle to attempt to carry on a farm profitably, keeping up the

fertility of the soil by the use of any commercial manure which has yet been placed within reach of Massachusetts farmers. It is, however, often expedient to use them to start a crop, and to help out a short supply of other fertilizers. But he who places his reliance on them will find his profits vary in an inverse ratio to the cash paid out.

Another difficulty of increasing magnitude, and perhaps the most perplexing of all, is the poor quality of much farm labor. We can many of us remember when young men from the country—neat, smart and intelligent—came among the farmers for work about the first of April in every year. Farmers' sons themselves, they knew how to perform every kind of farm work, and, best of all, they seemed to make their employer's interest their own. Now such help is rare, and we are obliged to depend largely on foreign labor, unfamiliar with our methods and often careless of our interests.

The farmer needs skilled labor almost as much as the manufacturer—unless his own eye can constantly oversee all his work—because this work of the farm is not a continual repetition of the same operations, like much of the work performed in mechanics and manufactures, but it is constantly changing; hence skill and experience, as well as good judgment, are required for its best performance.

Farmers do not commonly estimate the difference between the value of the service of a really good man and that of a poor one at a sufficiently high rate. The men of greatest physical strength and endurance are not always the most valuable, but rather those of less strength, it may be, who understand the diverse manipulations of farm labor, who are careful of tools, industrious, and mindful of the interests of their employer. It is certainly true that the aggregate cost of farm labor is now more than farmers can afford; but if they would discriminate more and pay their best men higher wages, instead of paying common wages to inferior help, it would be better economy, and possibly the quality of labor might improve.

The farmer's life is a never-ending conflict with weeds and insects. Mechanical ingenuity has been taxed to provide instruments for eradicating weeds in the most thorough and economical manner, but yet some kinds almost baffle the farmer's efforts. By constant and timely cultivation, most of the com-

mon weeds which infest the garden and hoed crops can be subdued.

But there are some great pests, like white-weed, chick-weed and witch-grass, which defy the most determined energy and skill and reappear like the phœnix when they seem to be exterminated. Some writers have the boldness to say that witch-grass has a value, and even recommend it as a good grass to cultivate. But a long and intimate acquaintance with this nuisance, does not impress one with a deeper sense of its virtues. The only redeeming quality it possesses, is that the hay, if cut early, is good fodder. Its presence in the soil nearly doubles the labor of cultivation; and unless thoroughly kept in check, seriously diminishes the crop.

I think, also, that its effect in a highly cultivated farm, is to materially reduce the crop of hay. It does not, like other grass, grow thickly, but tall, coarse, and with stalks widely separated. It kills out other more valuable grasses, and in a short time "binds itself out," unless the land is kept very rich. Although it may be impossible to exterminate this pest from land once thoroughly filled with its roots, it may be managed so that it will not materially injure the crops for some years.

It cannot be killed by hoeing, because the root-stock has innumerable joints, each with a bud and tuft of roots ready formed to grow, and cutting up has the effect to produce many plants instead of one; but like scourges of society, it may be effectually disposed of by strangulation. Any crop that will thoroughly shade the ground until late in the fall, will effectually destroy witch-grass.

The potato is one of the worst crops to raise on ground infested with this weed, because the tops usually die early in the fall, and the crop is not harvested until later. But a good growth of cabbages, turnips, or even fodder-corn, will sometimes kill nearly every root. The decay of the coarse, serpent-like root-stocks in the ground, not only adds an element of fertility, but renders the soil more friable; hence another reason for killing the roots in the ground, instead of attempting the hopeless task of digging them all out and carting them away.

Destructive insects are more troublesome than any weed. They come when least expected, remain for a time, and disappear without any visible cause. There is nothing more vexa-

tious than to see our choice plants cut down by some destructive vermin that spring into existence as if by the sudden bidding of Omnipotence. Scarcely do our young squashes show themselves above the ground, than the striped bug appears and gorges himself on their tender leaves. We sift on some plaster, and congratulate ourselves that the plants are saved, when we find a creature on them more disgusting than any substance we can apply to drive him away.

We place a shingle in the hill, and by carefully watching every morning, and crushing every squash bug with a stone, our vines are at last free from bugs and in the full tide of luxuriant growth. We feel sure of a crop; but some fine day we see the vines begin to turn yellow and droop; we examine and find a worm in the stem against whose ravages we are helpless. We see our vines wither away one by one, until our plants and expectations of a plentiful crop are dead together.

And so almost every crop we raise has one or more insect-enemies. What the canker-worm leaves the caterpillar eats; and if we protect our trees—as we may—against these crawling abominations, the curculio and codling moth attack the fruit, and it drops before half grown.

The flea and the cut-worm eat the young cabbages; and the white grub cuts the roots from the strawberry, while we helplessly look on and see the plants wither away; the currant worm deprives us of one of our most delicious summer fruits; the European cabbage worm has made its appearance, and we are told that we can neither prevent its ravages or make use of the plant after it has been tunnelled by this destroyer; and worst of all we are assured that the Colorado bug is steadily and surely making its way eastward, bringing with it ruin and destruction to the potato.

What purpose these destructive insects serve in the great plan of the universe is a puzzling mystery which may well be classed with the other great questions of "good and ill, foreknowledge and free fate," which puzzled the fallen angels.

It is gratifying to know that the same Hand that sends the bane sends the antidote. These insects not only have numberless enemies among the birds and other insects, but they all have their parasites by whose energies they are swept away, when they become too numerous for endurance.

We must regard these troublesome enemies with the philosophy thus expressed by a modern writer:

"Great fleas have little fleas upon their backs to bite 'em,
And little fleas have lesser fleas, and so *ad infinitum;*
And the great fleas themselves in turn have greater fleas to go on,
While these again have greater still and greater still and so on."

Naturalists could render no greater service to the community than to investigate the habits of parasitic animals for the purpose of ascertaining whether it is possible to introduce or increase them by artificial means, so as to aid the farmer in his warfare against the insects that prey upon his crops.

The good farmer will be a careful observer of the weather. Not only during harvest, but at all seasons, the farm work for the day often depends upon the weather probabilities. We must remember that storms do not come by chance, but in obedience to certain atmospheric laws which are yet imperfectly understood, but which manifest themselves in certain well-known phenomena, preceding or accompanying these disturbances. The system of weather reports inaugurated by the national government is unquestionably destined to be of immense value, not only to commerce, but to agriculture. It is almost certain that at no distant day the weather bureau at Washington will be able to predict the arrival of a storm at any particular point, with almost as much certainty as the arrival of the railroad train or steamboat. It will only remain to devise a system of signals by which this information can be transmitted over the country, to enable the farmer to prepare for a storm several hours in advance.

I have thus mentioned some of the contingencies against which the farmer can be more or less guarded; but there are others which are beyond his control or foresight.

The farmer's business is with the great forces of nature. He may lay his plans with the utmost skill and prudence, and drought, or wet or cold may destroy them all. His success, however, will depend upon the exactness with which his operations conform to the laws which govern the elements. In this respect his business differs from every other. The manufacturer, for instance, takes a piece of dead matter, like cotton or steel, and makes of it what he chooses. He knows beforehand

just what kind of product will come from his machinery, the quantity he will obtain, and what it will cost to produce it. If his machinery goes wrong, he can stop it, and when he has once learned to manufacture an article, he can go on indefinitely producing exactly the same article.

The farmer desires to manufacture potatoes. He deposits his material—manure and seed—in the ground, and patiently waits for the inscrutable machinery of sun and earth and air and water to form his product. Over this machinery he has no control whatever, and he cannot tell until harvest how much his product will be, or what it will cost. And if he obtains a superior article, he is not certain that he can reproduce it. Just here arises the uncertainty which surrounds the operations of the farmer. It needs no argument to show that the man who desires to cultivate the land intelligently, needs all the aid which science can furnish; and, indeed, science stops far short of his needs. He cannot succeed unless his plans harmonize with the laws of light, heat, growth and moisture, although he may be ignorant that such laws exist.

And here I would not be understood to advocate farming by the book. Undoubtedly the man of science, who knows nothing of practical husbandry, will, as a farmer, turn out to be a splendid failure, and simply because his science does not go far enough. Science is not yet sufficiently developed to enable him to construct correct theories of agriculture. We know from repeated observations that certain results usually follow certain processes, but we cannot tell the "why or wherefore." We know, for instance, that a small quantity of gypsum spread upon certain lands produces a wonderful effect, while a like application to other lands has not the slightest influence; and yet I believe no one has yet explained satisfactorily the mode in which this fertilizer acts.

Perhaps no men have rendered greater aid to agriculture than Boussingault and Liebig, scholars of high scientific attainments, but who applied their knowledge to the practical culture of the land, for the purpose of ascertaining the laws which underlie the hidden processes of vegetable life and growth. Men like these are rendering the highest service to agriculture. Those who only experiment in their laboratories, and write out theories for farmers, based entirely on chemical analysis, are "blind leaders of the

blind." But those who, like a distinguished member of this Society, devote themselves to an investigation of the relations which chemistry sustains to agriculture, and test their theories in the field before giving them to the public, are entitled to the thanks of the whole community. It is only by the efforts of such men that agriculture can be raised to the rank of a science. A great hindrance which every observing farmer meets, is the length of time required to try an experiment. If we are desirous of ascertaining the comparative value of certain modes of culture, or certain special crops, we find we can make only one trial in a year; and some experiments, such as those relating to the application of manures, require more than a year to determine the result. And here we discover another important cause of the slow progress of agricultural science. The most carefully conducted experiment is liable to mislead, by reason of the many influences which affect the crop during its growth.

It is only by careful and *repeated* trials that the farmer becomes certain of the superiority of any particular method. And even then, the effect he attributes to one cause may be owing to another. The increased crop, which he thinks is due to some special fertilizer, may be in consequence of some slight natural difference in soil, or amount of moisture, or other unseen cause. To illustrate:—Perhaps no class of experiments would be more valuable to farmers than a carefully conducted trial to ascertain the comparative value of the different kinds of food commonly used for milch cows. We should naturally think that by carefully measuring the food, and changing from one kind to another, the question might, after a few days' experience, be decided. But every dairyman knows that the quantity of milk varies from day to day for other reasons. Extreme heat or cold, drink at irreguler intervals, or the want of it, to say nothing of other causes, so modify the amount of milk produced, that it is next to impossible to determine with exactness how much the difference in the quantity of milk is owing to the difference in quality of the food consumed. We find a like difficulty in other experiments in husbandry. There are so many causes operating, which we can neither understand nor control, that it is not easy to determine how much of any effect is due to any one of them.

Here again we see the need of more light and further scientific investigation. We see, too, the value of a comparison of views among the tillers of the soil, who make claim to no other knowledge than that which is experimental. One of the most genial writers of the day, who unites to a high literary culture much practical knowledge of farming, recently gave the following excellent bit of advice:—"If farm writers would cultivate a nice habit of observation, and spend their writing force upon exactness of detail in regard to their personal experience, and leave scientific disquisition and theorizing to those who give their lives to such studies, I think we should all be much better off for it." Does not the value of an agricultural society depend mainly on the opportunity it affords for an interchange of opinion, and a public statement of agricultural experience?

If the statements I have made are in the main correct, it is manifest that at present there is no royal road to pecuniary success in agricultural pursuits, at least in New England. Some doubting agricultural Thomases even claim that there is no path here to satisfactory financial results, and that capital and labor yield in farming more meagre returns than in any other business. On the other hand, the outside world commonly regards us as chronic grumblers. It says we are always complaining of short crops of hay, rotting potatoes, extreme drought or too much wet, while *in fact* we generally pay our bills, appear to have enough to eat, and sometimes have a little money in the bank, and we are triumphantly asked "Who ever knew a farmer to fail?"

The truth, however, lies between the two extremes, as in the well-known instance of the two ancient knights, who quarreled about the composition of the shield. Farmers generally seem prosperous, and the reason is that as a class they have the faculty of living within their means. If they lay up money they do it by not spending, rather than by large profits. The truth is, my friends, we cannot reasonably *expect* our business to yield *very large* money returns. It is a well-established law of political economy, that any occupation pays a profit in proportion to the risk involved. This rule applies to all pursuits in life as well as to ours. There are few ways of employing capital in which the risk or loss is so small as in farming.

Hence, we should naturally expect the return to be corre-

spondingly small, but, on an average, sure. And I have sometimes thought, that if the excess of profits over the losses in the different branches of industry could by any means be ascertained, we should perhaps find ours not very far behind the rest. It is true that agriculture does not present the *possibilities* of obtaining fortune or fame, which are so attractive in commercial or professional life; but it does not involve the hazard. We can scarcely conceive of an agricultural Vanderbilt or Astor. The farmer's gains depend upon the same rules of business which insure success in any other calling. Brains, energy, and executive ability, applied to the culture of the land, will not fail to reward their possessor; moderately perhaps, but sufficiently for the ordinary needs of life.

We must remember, too, that distinguished success in any pursuit falls to the lot of but few.

"The many *fail*, the one succeeds;"

and if we think our neighbor's prosperity is greater than ours, it is but fair to conclude that the fault is partly in ourselves.

We have thus taken a view of our occupation only from the narrow ground of pecuniary interest.

It does not come within the scope of my present purpose, to discuss the æsthetics of agriculture, or its relations to the happiness of those who make it the occupation of their lives; but I desire to remind you, in closing, that this aspect of our vocation should not be disregarded. There is no branch of industry which has in itself so many elements capable of producing ease and content, as husbandry. Men of all trades and professions work and drudge in the hope that they may some day obtain a competence, and retire to a landed estate to enjoy the fruits of their labor. But who ever knew a farmer to retire from the farm to mercantile or professional life, or even to look forward to the day when he might enjoy his gains in some other employment? On the contrary, his attachment to the old homestead increases with advancing years.

The trees, which his own hand planted; the lands, once waste, which his skill and labor have caused to bud and blossom as the rose; the adornings of tree and shrub about his home,—are all redolent with pleasant memories, and unite to weave a bond

of attachment between the farmer and his farm, stronger than can be found elsewhere.

There is a healthy pleasure in country living in observing the myriad forms in nature, as well the graceful curve of a blade of grass, as the wavy swaying of a field of grain, or in viewing the woodland, the hills and the whole broad landscape, under the varying aspects of the procession of the seasons,—a pleasure which never cloys, which though old is ever new.

It is a mistake of our time, to neglect the cultivation of that faculty which enables us to derive pleasure from these sources. We are noted as a practical, matter-of-fact people, dealing with the hard realities of life rather than its graces. We take a certain pride in our rugged and robust ancestry, and place little stress on the more genial qualities they lacked.

"Beauty will not make the pot boil," is an old saw we take for our motto, forgetting that if it does not make the pot *boil* it furnishes a most piquant and relishing sauce to the contents.

We are endowed with the perception of beauty as a means of happiness; and it is neither unthrifty or effeminate for the farmer to prove all the pleasures

> "That valleys, groves, or hills or field
> Or woods or steepy mountains yield."

The most gifted men, from Xenophon and Cato and Virgil, down to our own day, have found their solace and delight in rural pursuits.

Let us, then, as farmers, make the most of our opportunities, not only to increase our store, but to derive from our surroundings as much as possible of enjoyment for ourselves and those about us.

If our gains are less than those of other callings, let us remember that the deficiency is partly made up by the comparative freedom from the perplexities and turmoil to which they are exposed, and by the healthy vigor of body and mind which is the usual accompaniment of rural life.

OUR SOIL, OUR CLIMATE, OUR CROPS.

From an Address before the Franklin Agricultural Society.

BY LEVI STOCKBRIDGE.

Our people, as a rule, have become so accustomed to speak disparagingly of Massachusetts as an agricultural State, that he who attempts to show that it has any special advantages of this kind, runs the risk of being called either disloyal or a fool. We are told that its soil is thin, hard, and stony, and has been robbed by an exhaustive system of cultivation of all the elements of fertility (if any) that it originally possessed; that its climate is fickle, cold and repulsive; that five months of the year is dreary winter, during which its valleys and hills are buried in snow, and for bare sustenance we are obliged to consume all the products the exhausting labors of the summer can produce; that wealth, or even competence, cannot be attained in the pursuit of agriculture here, without labor so constant and severe as to break down the toughest physical system, and an economy so rigid as to deprive one of all the luxuries and most of the comforts of life, and make him miserable and mean. We have become familiar with the oft-repeated remark, that the place for successful agriculture, where competence, independence and wealth may be obtained in agricultural pursuits, without the constant labor required by our hard soil, is at the West, or in the sunny South. All this (and the story is not half told), we almost daily hear of the pursuit of agriculture in Massachusetts. All this, and yet it is a fact, indisputable and clear as sunlight (and for which there must be some good reasons), that nowhere else in this broad, fair land, in a strictly farming community, are there such evidences of thrift, prosperity and competence as in the farming communities of Massachusetts. Nowhere else do we see such good houses and

barns, with their attached buildings for the convenience and comfort of the family and the domestic animals of the farm.

There are clearer indications among farmers here, than anywhere else, of intelligence, good taste and advancement, and more unmistakable evidence of a desire for improvement, education and position, and a pecuniary ability to gratify that desire. If our State is so destitute of agricultural facilities; if our climate is so very inhospitable as it is represented, and the facts in relation to our farmers which have been stated are true, we have a riddle for which there is no solution.

Now let us see if we cannot find some other and better reason for these ideas about the agricultural capacity of our State, and for so large an emigration of our people. The birthplace of the Caucasian race was in the temperate regions of Asia, surrounding the Black Sea; but in obedience to a law which was not of its creating, it immediately commenced a movement westward, nearly on the same line of temperature as that of its origin. The great wave of emigration was divided into two streams by the mountains of Central Europe, the Teuton taking the northern, and the Celt the southern line; but it has followed on in a steady stream, alike over uninhabitable mountain ranges, deserts and fertile plains, across great rivers, seas and oceans, until to-day it is building cities on the western shores of the Pacific. The great westward movement of this branch of the human family, age after age, has not been in search of good land, for often the soil in the rear was better than that in front. Neither has it often been to obtain better political or religious privileges. To our view, whether we call him Teuton, Saxon, Anglo-Saxon, or Yankee, he is a restless rover. He loves his wife, and thinks there is no other like her; he loves his children, and knows they are the best in the land. But though he has attachments for home, he makes himself believe that beyond the distant mountain-top, or over the river, there is a more fertile soil and genial clime than he possesses, and where a livelihood, competence and wealth can be obtained with little care and toil; and the belief drives him forward. This great western movement of one branch of the human family is most surely in obedience to an immutable law and for the good of the race, but as we view it in single cases or small communities, it is generally without necessity or reason.

Established residents on the alluvial soil of the Connecticut Valley removed and settled on the mountain ridges of Hawley; men of competence, living securely in settled communities here, removed, often alone, into the unbroken and malarious forests of middle and south-western New York, to Ohio and other States of the Great Valley, where, to make a home, relentless war must be waged with the aborigines; and to-day, prairie land is being deserted for the naked, rainless region of the plains.

It is not because Massachusetts is not a good home for a farmer, that such hard words are spoken of it, and so many of its sons emigrate; but it is in most cases because the emigrant, in obedience to the law of his nature, must have change, must explore new localities, must have a variation of circumstances either for better or worse; and some there are so variable, that if their location was in Paradise, they would soon conclude that by a little exploration they could find a clime better suited to their wants and desires. Now, what are the advantages necessary for a successful, prosperous agriculture? First, we must have a soil capable of producing food-plants in sufficient abundance to repay the labor of cultivation. It is said our soil is etsirle. Was it so originally? Could a sterile soil have produced and supported the dense, grand old forests which our fathers found here, extending from the sea to the Hudson? Were the alluvial bottom lands of our valleys,—of the Connecticut, the Housatonic, the Merrimack, and a score of others,—the fine, sweet loam of our foothills, sterile? It is impossible. Those stately forest trees,—the oak, the walnut, the maple and the elm,—sent their roots into a soil rich in the elements of fertility. These valleys yielded to their first cultivators sixty-fold of the cereal grains, and our hills were carpeted with a thick covering of the most nutritious milk and flesh-forming grasses. Until an immense manufacturing population gathered here, making a great preponderance of consumers, this soil fed and clothed its people, and produced a surplus for exportation. But some one says, that might be true of our State when first settled; yet now our soil is sterile in consequence of improper cultivation, and many an old homestead is deserted, and its fields are being rapidly restored to forest. This last I grant, and rejoice in consequence of the fact; for many a rocky

mountain top, steep hillside and declivity was cleared and called a farm, which nature never designed for, nor would allow to be successfully cultivated; and if we willingly, or unwillingly, are giving it up to the purpose for which it is adapted, the better will it be for our other fields and the aggregate productions. But I deny that our soil as a whole is so depleted that its products in the aggregate do not yield as rich a reward as other sections of the country. Compare the value of the important crops, acre for acre, with the States famed for fertility, and the balance is in our favor. Hay, as an example, is a leading and important crop throughout the Northern States, in some respects more valuable than any other. Now the money value of an average acre of hay in Massachusetts is $22.75; in New York it is $16.50; in Ohio, $17.50; in Pennsylvania, $13.80; and in Illinois, $13.30. If you compare the value of the products of hay, cattle, milk, butter and cheese, acre for acre, the balance is in our favor. If we look at the average yield per acre, we shall find we stand in the front rank; for the very reliable statistics of 1868 show that that year Illinois produced on the average, 2,800 pounds per acre; Massachusetts, 2,600; Pennsylvania, 2,400; Ohio, 2,600; and New York, 2,000. Turn now to grain, and see how poor, poverty-stricken Massachusetts compares with her famed sisters in their productions. Indian corn is our great national crop. In 1869 the value of this cereal produced by the whole country was $655,500,000. That year we averaged more corn per acre than any State in the Union, excepting Nebraska, Kansas and California. The average worth of an acre of corn, that year, taking into account both the corn and the fodder, was, in Massachusetts, $44; in Ohio, $18; in Missouri, $18; in Michigan, $16.80; in Wisconsin, $15.60; in Kentucky, $15; and in Illinois, $13.80. The same facts exist in relation to the production of wheat. Oregon alone averages *more* wheat per acre than Massachusetts, and Vermont is the only State which produces an equal amount. The money value to the farmer of an average crop of wheat, including grain and straw, is greater here than in any other State of the Union.

These facts are the answer which the soil of Massachusetts gives to those who say it is sterile and will not pay for cultivation, and show conclusively that, notwithstanding the exhaust-

ive cultivation from which it has suffered, it yet possesses the power to reward the labors of the husbandman abundantly. But, says the objector, I admit your crops are good enough, but it is by the hardest of work you can get them; and then your climate is cold and inhospitable; your long winters consume all your summer's products, and when the year comes round there is nothing left. Now a genial climate is the second great requisite for successful agriculture, and has as important an influence in determining the character and quantity of the products of a given area of land as the soil itself. It is the climate which in the vegetable world of the tropics produces the palm, the sugar-cane, the banana, and all its magnificent flora; on the great plains of the West, naught but the miserable sage; in the polar regions, lichens and mosses; and in the temperate zone, the cereals and nutritious forage plants. In the animal world, it is the climate which produces the elephant, the lion, the anaconda, and myriads of gigantic, poisonous, tormenting insects of the tropics; the white bear, the walrus and the seal of frigid regions; and the horse, the ox, and the sheep of temperate latitudes. As of other animals, so of man, it is climate as a prime cause which has made different races, with their peculiarities and characteristics. The climate of Africa made the Negro race; of Greenland, the Esquimaux; of Southern Asia, the Mongolian; and of the temperate belt, the Caucasian, with its minor families, Teutonic and Celtic, with their special traits.

Now for what and to whom is the climate of Massachusetts really uncongenial and inhospitable? It is uncongenial to the palm of the South; to the worthless sage and lichen of the North; to the lion, tiger and tormenting insect world of the tropics; and to the white bear and seal of the Arctic circle. But for everything which is really the most valuable and useful, both in the animal and vegetable world—for every product whose influence, in its production or its use, tends to promote the welfare and happiness of the individual, and the prosperity of a State—the climate of Massachusetts is genial. Removed from the enervating and debilitating influence of the South and the North, the climate has just enough of vigor to give strength, vitality and exhilaration to all organisms, vegetable and animal, which it produces.

Had the passengers of the Mayflower landed a few degrees to the north or south of Cape Cod, notwithstanding their many virtues, they could not have created a Massachusetts. It is this climate, in its direct and indirect influence on our mental and physical constitutions, which has made it what it is,—the grandest Commonwealth of the nations;—and though but a speck on the earth's surface, has given it an influence as wide as civilization has extended. He who ignores it, and emigrates, except on the same line of temperature, relinquishes for himself or his posterity all its legitimate results, and sacrifices the grandest conquests and enjoyments of humanity to his desire for ease and inactivity.

The next great requisite for successful agriculture is a good market. Markets for the farmer are made by a large consuming population, whose labor is not directed to the making of food products; but that the market may be the best possible, certain things are necessary: First, that the consuming population shall be in close proximity to the lands which create their supply; second, that its occupations shall be stable and reliable, and give the pecuniary means of supplying all its wants; third, that it shall be intelligent and cultivated and have all the varied wants to be supplied, of communities in an advanced state of civilization. Such a market is the best, because no community or nation of farmers can be permanently prosperous which is compelled to transport its products long distances, or export them beyond its territory to find consumers, as it must pay the cost of that transportation, and the fertilizing elements of the crops are forever lost to the fields that produced them. They are the best, because the necessary agricultural investments to supply a given demand are of a permanent nature, require time for their development, cannot be easily changed, and must have a corresponding market and sure return. Best, because that the higher are your customers in the scale of improvement, the more numerous will be their desires to be gratified, and the greater the profit on the articles of their consumption. Now, have the farmers of our State the advantage of such a market? Are they not reaping all its benefits?

Our population is one of the most dense on a given territory of any State on the western continent, and much the largest proportion of it is occupied in pursuits which make no food.

Our manufacturing industry in every branch of its productions is immense, and it has gathered here artisans and laborers in corresponding numbers. Unlike England and other European countries, this population is not mainly collected at a few points, forming great cities with their attendant evils, but it is located in villages and communities all over our area; alike on the hills and mountains of Berkshire, Franklin and Worcester, and the gentle slopes and lowlands of Plymouth and Bristol. Wherever water can be found in sufficient volume to turn a wheel, or fuel to give action to an engine, there a manufacturing population is congregated adjoining the farm lands which ought to supply them with sustenance. And we have not only a large manufacturing, but a large commercial population. Massachusetts has become an exchanging and distributing point for a great extent of country, both at home and abroad. This industry is destined to increase until it will be immense, and give employment to multitudes whose food must be the product of farm labor.

From any other standpoint than that of the farmer, I should say that the relation between our food-consuming and food-producing classes was considerably out of proportion, and we should find it so if we were deprived of our communication with the other States. In fact, if the people of Massachusetts were to-day shut up and confined to their own area, with all the stores they have on hand, and all the bountiful harvests of the year safely garnered, we should not have food enough in reserve to keep them from starvation until the next harvest. And for years the present farming population could not supply the necessary amount, even if they ceased the production of all comparatively worthless plants, and devoted all their present arable soil to making food products. Our markets, then, are all right so far as the extent of the demand and nearness are concerned; they are all right, also, in the endless variety of wants and the ability of the consumers to pay for their gratification. There is not on the face of the globe a population of equal numbers, occupying a contiguous territory, who in intelligence, education and refinement, and in all the necessities which refinement and education create, are superior to ours. And nothwithstanding all the hue and cry and "clap-trap" of demagogues and agitators concerning the contest between labor

and capital, and the wants and oppression of the operative class, there is nowhere else an aggregate population of equal numbers who have such stable employment, are weekly earning and receiving and accumulating so much money, and are better able to procure the necessaries and luxuries of life.

Once the idea was entertained that it made little difference where a farmer was located, provided the soil was good. He might be in the centre of a wilderness, on a distant mountain-top, or a hidden valley among the hills, far away from great thoroughfares and populous centres, and no roads to them but bridle-paths and trails. Then it made little difference, for it was little he had to sell, and that was of a kind which the market would not take. He depended upon his farm to supply all his own wants of food and clothing, and was independent of the outside world as a purchaser or seller. Then, farming was the raising of every crop which it was possible for the soil and climate of a given locality to produce. Now, farming is the concentration of all intelligence and energies to the making of one or two crops for which our soil and climate is specially adapted, and for which some market makes a demand. For this reason, quick and cheap transportation is all-important—is just the difference between success and failure; good, easy communication enabling us to send to market those products which are most profitable, and poor ones compelling us to make crops which little more than pay for their transit. Now a farmer should have to his premises a good, public highway, kept in complete repair, along which he may, without let or hindrance, convey with his own team his products to his near market, and should be conveniently near to the lines of steam transportation, that his crops sent to more distant localities may reach their destination speedily and uninjured, and be enabled to make those profitable products which must not be long in reaching their destination. In this respect, also, our advantages are superior to those of any other section, and especially of the great producing States of the West. Our legal system, by which our common highways are constructed and kept in repair, is one of the best, and it is heartily sustained by our people. Our common roads are a perfect network, crossing the country in all directions, and giving our farmers direct, free communication with the centres of trade and population.

Railroads which annihilate distance, cheapen transportation, preserve products and bring new markets within our reach, thread their way among our hills from north to south, and east to west, and are doing for us with punctuality and dispatch the labor of a host of beasts of burden. The number and quality of both of these avenues of communication is rapidly increasing, and every benefit to be derived from this source is surely ours. If, then, this course of reasoning and these facts are correct, Massachusetts, as an agricultural State, has a soil and climate that are genial for the production of a class of animals, reasoning and unreasoning, which are as good, to say the least, as any the world has ever seen; and genial for the production of those plants which such animal natures require; the advantage of markets beyond any capacity of ours to glut, which are stable, of great variety, able to pay, and adjoining the fields we cultivate, and the very best, the cheapest and quickest communication to all desirable points. But our markets are free, as they should be, to the agricultural products of the world. Those who have no markets of their own seek one here, and thus become our competitors; but distance, facilities and cost of transportation confine them to a very few of the articles contained in the list which our market demands.

Remembering this, that our farmers at present cannot supply all the food our population requires, and that much of it must come from abroad, the practical question for us to decide is: What crops which our markets demand shall we grow, which do not bring us into competition with the foreign producers? An average acre of hay in Massachusetts is worth $22.75; in Illinois, $13.30; and with that difference in its value, the Illinois or any other Western farmer cannot send hay here. Until they get their eyes open (which will not be long hence), the farmers of Vermont and Maine will send us some hay. But notwithstanding this, hay is, and is to be, one of the best crops our farmers can raise; the best for profit and for the fertility of our farms, because most of it is sold in adjoining towns and cities, from whence its fertilizing elements may be returned to the fields from which it was taken. In the products of hay, milk and butter, the field is practically all our own. The other New England States share in the advantage, but the West cannot compete or interfere. The average worth of an acre of

corn in Massachusetts is $44.00; in Illinois, $13.80; and there is about the same difference in the value of wheat. Now these are crops which the Western farmers can transport, and with the ideas entertained by a majority of them, about the only ones they can. In fact, necessity compels them to send them to our markets, if they do not get half paid for the labor of cultivation. Though we can make as much money on an acre of these grains as any man in the West, yet with our advantages we can do much better in some other direction. Let their grain come and be fed here to enrich our fields, while we make double the money in producing fruits, vegetables and other products which distance renders it impossible for them to send. When we remember the great variety of articles of consumption which our markets require, and which our soil and climate produce in perfection, and the small number which farmers abroad can really afford to supply, we shall see that we possess a field for the most prosperous and successful agriculture in the Union. I say this, not to discourage emigration, for that has never injured us, and it has been our country's salvation; but I say it to encourage those who remain to avail themselves of and improve our intrinsic advantages for their own welfare and that of the State.

FARMERS NEED A HIGHER EDUCATION.

From an Address before the Hampden Agricultural Society.

BY HENRY K. OLIVER.

History ignores generally the arts of peace, and makes little mention of the wealth-producing industries of a nation. Specially true is this of the memorials of agriculture; and what I propose to say to you to-day, of the agricultural life and methods of early England, for the purpose of contrasting them with those of recent times, in both Old and New England, has been obtained by much search and not a little patient assiduity.

After the conquest of Britain by the Romans, and the settlement therein of Roman colonists, agriculture received greater attention, and her cereal crops were so largely increased that they were made articles of export, and she became to the northern possessions of Rome, what Sicily was to the southern, and what the Western States are to us, the great producers and reservoirs of grain.

Overleaping now, some five centuries, lighting down upon the Anglo-Saxon period, we find that the incursions of the Northern barbarians had seriously retarded the progress of agriculture, as war always does, robbing the farmers of the products of their lands, and blunting every stimulus to agricultural industry. Both their stock-breeding and their tillage were without any influence of scientific principles, each generation doing as its predecessors did, and following traditionary methods. Their cottages or huts, hardly better than a Welsh pigsty, which they resembled in form, were made of wattles plastered over with clay, without chimneys or windows. Neither bed nor bedstead invited the wearied laborer to repose. Ignorant were they, superstitious to the

most foolish degree, and incredibly nasty in personal dress and habits, even as late as the reign of Henry VIII. The nobility themselves, and the higher gentry, owners of castles and halls, flocks of sheep and droves of cattle, and herds of swine, lived in a style at which a modern workman of skill in any craft would revolt.

To the monks of Catholic England fairly belongs the high praise of being the promoters of improvements in husbandry in these benighted times. They were well acquainted with the best modes of culture practised in Normandy, and their education and intelligence enabled them to make a judicious practical application of their knowledge. Agriculture slowly improving, and improved methods increasing the yield per acre,—somebody thought it worth while to make a permanent record of so encouraging a fact, and we have in the sixteenth century the first sample of a book on farming,—the pioneer of that great host of books that have since been written, neglected, and not seldom ridiculed by the many who think that a traditional, verbal method, handed down by word of mouth, is all right; but if anybody writes it down, and it then be printed and be read, it is all wrong, nonsense and twaddle, and the mere theory of book-farmers.

By the close of the sixteenth century, great advance was made in the comforts of domestic life. Old Harrison, who wrote about the same date, says that the good yeoman farmer of his time, although rents had greatly advanced, "would think his gaines were verie small if he had not six or seven yeares' rent lieing by him—beside a faire garnish of pewter in his cupboard —with so much more in odd vessels about the house; three or four feather beds, so manie coverlids, and carpets of tapistrie, a silver salt, a bowle for wine (if not a whole neastle), and a dozen of spoons to finish up the sute."

Making a long leap, Cromwell was himself a friend and encourager of agriculture, and from his time down, the cultivation of the soil began to interest men of education and of wealth. It left the unlettered hinds to which it had been greatly confined; and alluring intelligent labor to its aid, made an onward progress that, surprising its old adherents, and encouraging its new friends, united them all in the promotion of its further success.

The cultivation of the turnip, by Tull's method of drilling and horse-hoeing, though ridiculed by the old, the ignorant and the prejudiced, has actually trebled in value thousands of acres of light lands, the value of the crop sometimes surpassing that of the fee simple of the land. From the time of the Restoration down to the present day, the union of mind, capital and labor, the introduction of new roots and grasses, the alternation of crops, the methods of drainage and irrigation, carried to a great extent, have made and will continue to make England almost the garden of the world.

And now, what, at its beginning, was the agriculture of New England, with its early Puritan Fathers, who, "accustomed in their own native land to no more than a plain country life and the innocent trade of husbandry," followed (both from choice and necessity) the same occupation here? Their early harvests were eminently fruitless, so that, even in the third year of their settlement, they often knew not at night where they should get a bite in the morning. Their culture was that which they practised at home, modified by the difference of climate and of soil here, where they had no beasts of burden, scanty supply of seed, with few laborers and small yield of harvest. For a century and a half subsequent to the first breaking up of these wild lands, the system of tillage all over New England was essentially the same, and comparatively unprofitable, the mere delving and drudging of farming, with few or none of its present substantial encouragements. It was *hand* without the *head*, with the same obstinate prejudices against "book-farming," as any scientific suggestions were called, and the same attachment to old ways, old implements, old management of the soil, old systems of cropping, old systems of treating manures, and of giving them to the soil,—systems containing some good things for a certainty, and some very poor things of an equal certainty,—among which poor things are the monstrous waste of manures, amounting to millions of dollars annually, by neglect and exposure, and the omission to compost dropped manures with the muck of meadows and the leaf mould of woods.

Some of these men, within our memories, growing weary of this ceaseless toil, of the hard climate, and of the ungrate-

ful soil of the land of their birth, and having heard of more productive fields and milder skies far towards the setting sun, and feeling, like Father Abraham, they were called to go out to possess a new and better land, obeyed the summons, packed up their unsold traps and started for the unseen realm, with their horses and cattle and wagons, "women and children piled on top, and pots and kettles dangling and clanging beneath,"—journeying by day and camping by night,—hoping everything and fearing nothing, a crowd of strong-bodied, strong-willed, long-winded, long-sided, whittling and whistling and smoking, shooting and swapping Yankee Arab wanderers, with axes and knapsacks on their backs, rifles on their shoulders, and pistols in their belts, bent on locating and squatting down where they should not have a neighbor within five hundred miles, more or less,—and there they settled, in a land of immeasurable fertility, of unspeakable fever and ague, as destitute of the comforts, as it was of the schools, the churches and colleges of dear New England. Yet men they were of the right blood and the right mind, and so, as step by step, they rescued from the savagery of barbarism the wide domain of the great West, they inaugurated in every village and town, as they sprang into life, the means of that intellectual, moral and religious culture to which we owe the goodness and the greatness of the land they left behind them.

Now, what is book-farming,—whence did it come and how did it take its book form? Why, from the manuscript of some writer, whose written words the printer set up in types, and multiplied and circulated copies, that many eyes and not a few might read, and many minds and not a few might learn and know. But whence the written form? Why, it is but the recorded memory of what some practical farmer, or some agricultural experimenter, has proved by his own actual trials and experience to be of practical utility, and so he has written it down that the information may be diffused for the general good. Now if you read this in a book, and are counselled how to proceed in order to increase your product, will you toss away the information from you with contempt because it is bookish, and you don't believe in book-

work, and so keep on in the "good old way," as you call it, with your crops growing

"Small by degrees and beautifully less?"

Or will you rather endeavor to learn whether your own want of knowledge in the premises, may not have caused you to plant your seed in an uncongenial soil, lacking the very element necessary to your crop, and that therefore you have failed to reap where you have sown? So let me urge upon you with special earnestness, that while you cultivate your farms and bring to bear upon them every appliance that can invigorate them and so increase their productiveness,—making two blades of grass to grow where but one grew before,—making two golden apples to blush on the branch where but one before did glitter in the sunbeam,—that doing so much for soil and fruit, you should not omit to do something towards enriching your own intellect, making two useful thoughts to spring where but one sprung before; something towards the cultivation of your moral natures, making two useful acts to quicken into their blessed work where but one had blessed before. Your own *interest* itself is promoted by perseverance in such culture, and the wiser you become in all proper and useful wisdom, the better and more abundant will be the results you shall secure from every acre you may till, the richer the harvest that shall ripen from the seed you shall have sown, and the nurture you shall have given it.

The agricultural people of our Commonwealth, have, in all time of its existence, done great and good things for the State, and the State hath requited by doing great and good things for them and for their children, and she has a further right which must not be ignored, to require yet other and greater and better things. And to be able to meet her just requirements, her farmers must be well educated—educated in the noblest interpretation of education. I do not mean to say that they are not, in the general way, an educated people. That is conceded; but they must be still further educated, and educated up to the highest demands of the art they practice,—educated that they may bring forth better or greater results by the application of more enlarged minds, and of the power

gained by a wider and more liberal study of agricultural science, and the direct practical application of such science to the treatment of their soils. For if true farmers they be, I cannot conceive that they would be willing to exchange the plough and the sweet odor of field and wood, the varied, cheerful music of nature, which fills and blesses the country air, the secure quiet of their homes, their fields of ripening corn, their sheaves of golden wheat, their ruddy apples, the mellow fruit of their orchards, their rich crops of yellow grain, their mown lands, glittering with sun and dew, their verdant pastures, and their groves, God's first temples of unsurpassable architecture,

> "Their rills melodious, pure and cool,
> Their meads with life and beauty crowned,"

their majestic oaks and beautiful elms and trees of thousand kind, their herds of lowing cattle and flocks of gentle sheep, their mountains, valleys, hills, the glory of their early morns, the gorgeous beauty of their setting suns, the radiant shine of their harvest moons, the fantastic brilliancy of their autumnal leaves,—for all the false and fleeting pomp and circumstance, the tinselled dazzle and the cumbrous splendor, of fashion and the town.

UTILIZATION OF LABOR.

From an Address before the Hampshire Agricultural Society.

BY PAUL A. CHADBOURNE.

Peace as well as war has its triumphs and its days of ovation. In time of war there are days of review when the hosts are marshalled, not for conflict, but to show what they have done and what they are able to do. Then it is that the brave leader glories in the empty sleeve; and the flag, soiled and scarred by the storm of war, is more honored than the richest silken folds that have never cheered the soldier on the battle-field. Every symbol of work accomplished is an earnest of work that will yet be done. But now in the lull of arms, peace marshals her forces and from time to time brings together the products which she has to offer, instead of the mere pomp and devastation of war.

In such a review of her labors, in New England, if in no other portion of the world, we may see what men enjoy under a free government, and what varied sources of enjoyment may be found for every citizen even on this hard soil where frost and drought and rain have each in turn the mastery.

It is a happy thing that toil may be suspended and that no favored class, but the great community, may join together in a grand review of the labors and triumphs of the year. This is the object of agricultural fairs throughout our country. They are not simply *agricultural* fairs, though they bear this name, but exhibitions of every form of honorable industry in the section which they represent. The farmers come bringing the finest of their herds and flocks, the housewife spreads the rich products of the dairy, and the mechanic brings his wares. Wood, and iron, and brass, and wool, and flax and cotton, are shown in the thousand forms which civilization demands. The artist brings the product of his pencil, and whole departments of beauty proclaim that we have higher wants than food and

shelter, and that cunning hands are busy in our midst to minister to those wants. The young girl, hardly budding into womanhood, and the aged mother whose children have long been men and women, both contend for the prizes. The tables are piled with apples more delicious and beautiful than all the famed fruit of ancient mythology, grapes in richer clusters than Bacchus and all his ancient votaries ever dreamed of. All the fruits and flowers, which New England soil can be made to yield, all the handicraft which fertile New England brains can invent, are gathered in these fairs for our admiration and for our profit,—for the honor and gratification of those whose care and labor have produced them. These fairs, then, are the grand review days of the great peace forces stationed within our borders, holding the farm-houses and villages, the school-houses and churches of happy New England.

All these products represent so much toil of hand and brain. The earth has, indeed, yielded her strength, for all this wealth of fruits and flowers was moulded from her soil. Last spring most of them were dirt beneath our feet.

All nature has been in action both to build up and to destroy. And it is because man has lent the energies of his mind and the strength and cunning of his hand to secure the favoring influences and to ward off destroyers, that the hills are filled with flocks and the valleys are covered with corn. If this wealth here gathered is the product of the earth, it is also the result of human toil.

We are ready to maintain the dignity of labor, but it is the product of labor that is the measure of its dignity. There is no dignity in wasted labor. Labor wholly unproductive would become intolerable punishment even to the most industrious. But the hardest toil is lightened when every blow is followed by results, and every blow is honorable that is struck for the physical, intellectual or moral welfare of the human race. Labor becomes dignified just in proportion as it becomes powerful for good, as it yields greater products which the best civilization demands. And all this grand exhibition is to show what means of enjoyment the labor of the year has supplied and how the labor of the coming years may improve such products and give larger returns for the thought and strength expended. The grand problem is to *utilize labor*, that every hour of toil

may produce more and better results, as the years pass. The wants of savage life are few and call for little economy of time or strength. But far different are the demands of civilized life. New wants keep pace with new discoveries and new inventions, till the simple New-England home represents skill and labor astounding to one who traces all its comforts and luxuries back through all their processes to their original products. The varied fabrics of the household! How many mills, what complicated machinery and wonderful chemistry do they suggest! The well filled library demands for its production an army of laborers. Every time the frugal meal is spread, we find upon the table the products of other lands supplied only through the discoveries and commerce of civilized nations. A whole nation of savages could not, in a life-time, supply by their labor the products in one of our best New-England homes,—homes the result of the toil of a single civilized man. He has all these sources of enjoyment because civilization has utilized labor, and thus multiplied a hundred-fold the powers of a single man. This utilization of labor has still further advanced civilization, and thus we have the conditions of progress for the race. Civilization and utilization go hand in hand, mutually reacting upon each other.

And where are found the grand elements of this utilization? Plainly, first, in the forces of nature. These forces are guided and controlled by man till they become his never wearied servants. The rains and dews upon the hills gather in springs, leap towards the valleys in rivulets, until their combined weight, poured upon the ponderous wheel, gives life to the spindle and the loom. The guiding hand of man is needed, but with the aid of this falling water, he draws out a thousand threads as he could but one by his unaided strength. That wheel, through which the water plunges by its own weight as it rushes on to find its ocean level, multiplies the labor of all who work above it a hundred-fold. It took time and hard labor and skill, indeed, to dam up the floods, to lead them along in canals and to fashion all the wheels and shafting by which their power is transmitted from room to room and machine to machine. But all of this labor is but a fraction of the multiplied power which they give to the service of man, before worn out by their own revolutions.

The forest trees and beds of coal are so much garnered strength,—strength set free by fire that by expanding steam moves titanic wheels and levers obedient to the will of man. Calling this power to his aid, the engineer hurls the proud ship against wind and tide and moves the heavy laden train with the swiftness of the wind.

Other and more subtle forces are pressed by man into his service. The mysterious needle that tends ever toward the polar star, guides him in his pathless track upon the ocean. Clouds may shut out the friendly stars, nor land nor light direct his course, but following this unerring guide he passes straight on his way to the desired haven. Danger is thus avoided where the wisdom and skill of man alone would be powerless to direct, time is saved, and the labor of all that go down to the sea in ships is utilized by the magnetic needle. Take from every ship that little finger of steel by which the earth points out the track across her own pathless waters, and the dangers and expenses of all ocean transportation would be doubled. As though this were not enough of magic, the same force that points the needle, darts from city to city and along the ocean's bed from continent to continent, whispering in every hamlet the news of the morning from every quarter of the globe. The former work of weeks and months is pressed into hours and minutes. It tells us of the coming storm, while yet the skies are fair and winds are still. Chemical force at the command of man unlocks elements held in its grasp, and leaves them free to give their energy to his service. The mingled carbon and nitre, fired by a single spark, let loose the imprisoned gases to change the face of nature and the destinies of nations. With gunpowder, man makes his way through mountains of stone, and shakes the affrighted earth as he tears out treasures from the rocks in the deepest mines. He hurls the messengers of freedom, and with thunders of the cannon and bursting shell proclaims the arm of the oppressor broken and the reign of universal liberty and equal laws.

In all these achievements, we see a partial fulfilment of man's destiny when created the possessor and lord of the earth. He was to have dominion over the earth, and created in the image of God, this dominion could only be complete when he had pressed into service all those forces, through which the

Creator carries on the changes in this physical universe. Not a single force is there now in operation in the earth or air, not a single force or agency has there been, in all geologic time, that man cannot in some way, even now, make minister to his comfort or multiply his power. Every year he enters more fully into this great inheritance. Every year he compels the forces of nature to lighten manual labor. Every year does he gain greater mastery over these unwearied and exhaustless agencies, and thus realize more nearly his likeness to his divine Creator.

But all this utilization of labor, though everywhere apparent in the mechanic arts, has little bearing upon agriculture, you are ready to say? It has, indeed, much less than it ought. For when dominion was given to man it was that he might till the earth and subdue it. He will forever eat his bread by the sweat of the face, for agriculture must, from the nature of the case, ever demand long-continued, careful manual labor. And because this is so, every advantage should be seized upon to utilize that labor. Every blow must be made to tell. And to secure this result, ignorance and waste must both be banished from our farms.

Unfortunately for us, the need of utilizing agricultural labor has never pressed upon us as a nation. A broad territory, unsurpassed in fertility, and almost boundless in extent, is even now waiting for man to scatter the seed upon it and gather the luxuriant harvests. The great productiveness of the American soil has given a rich return to the rudest forms of husbandry. And when one plantation has been impoverished, an abundance of virgin soil is ever waiting for the plough. The cultivators of the earth have been, like the early miners on the gold-fields, gathering the gold ready quarried in the hand. The corn and wheat and cotton have been taken from the soil without return; but such drafts are sure to be dishonored in the end. The account with the earth must be kept good as well as that at the banker's. The practice of the agriculturist has too often been, like that of the spendthrift, who ruins his credit in one place and then tries a new sphere of action, leaving unpaid debts in every town.

The inventor's genius has been brought to the farmer's aid, but the most effective machines are those for sowing seed and

gathering harvests, increasing ten-fold the farmer's power to rob his soil. In the garden States of the West, this process may be long continued, but every year the product lessens and the robbing process must finally come to an end. We may feed the world with our grain and supply its busy looms with cotton, but in more than one-half of our country we do the work by sheer land robbery. Any process that yearly leaves the soil poorer in materials for crops, is unworthy the name of agriculture.

And so it happens that no portion of our country is so favorably situated for the increase and diffusion of agricultural knowledge, as New England. Her soil is thin and rugged, and her climate severe. It is impossible to live by land robbery here. New-England soil is no long-suffering creditor. You must make full returns for every crop you take, or your drafts are protested at once. All the conditions of New England life as well as the physical condition of its soil and climate, prevent the Southern and Western methods of cultivation. A New England farm would hardly be considered a respectable corn or wheat field in the West. Narrowed down then, by the necessity of the case, to a few acres,—having a soil that must be carefully manured and tilled to produce a crop,—living in a climate where winter reaches far into spring, and early frosts often destroy the finest prospects of a harvest, having all these adverse conditions to contend against, the New England farmer has been compelled to work more with hand and head than any other tiller of the soil in our land. These hard conditions are the secret of the increase of agricultural knowledge among us. The Western man wonders where our farms are found,—wonders how we can live,—says that New England would have been left to the bears and wolves if the West had been known to the early settlers. But if he is a man of intelligence, he knows that nowhere else in our land is the *science* of agriculture so thoroughly understood and applied, as among the New England hills and valleys. Had we been shut out from the fertile West, we should have known more than we now do, and New England soil would have been richer and more productive than it is to-day.

But we proudly point to the products that are now gathered in every part of our State, from Plymouth to Berkshire, as

proof of Yankee skill in wringing from a scanty soil the choicest fruits and golden corn. Luxuriant crops and the finest of herds and flocks are here on exhibition. And if we have not the abundance of our Western brothers, we glory in our crops as the product of thought and labor.

The time is coming when the deep soils of the West and South will have yielded their superabundant riches, and, like New England, their soil will demand the fostering care of agricultural science. The time is near at hand, when those broad plantations, once growing poorer under the impoverishing curse of slavery, and the rich prairie, starved by years of robbery, will be the homes of busy millions, a crowded population cutting them into small farms, and reproducing in every part of the national domain, something of the New England type of life. This is inevitable under those wise laws that, forbidding the entailment of land, subject it to the chance of sale and division at least once in every generation.

It is not then for New England alone, it is for this great country of ours in its future, that we invoke all the aid that science and skill can render to increase the fertility of our soil and the variety and richness of our products, that within our own borders may be found all that the highest civilization demands, though the rest of the world were sunk beneath the ocean or leagued together in arms against us. And where shall we look for the field of investigation and the line of discovery and invention that shall do for agriculture that which has been done by science and inventive skill to utilize labor in all the mechanical arts? We want something more than mowers, and reapers, and shellers,—something more than improved implements for putting in and gathering crops. Our fruits must be the most delicious, our grains the most prolific, our herds and flocks must be the finest in form and quality. In the improvement of all these lies the farmer's greatest power for utilizing labor. He must know how to secure the most productive soil and how to bring every product to the highest standard of excellence. Just so far as he does this does he render every blow he strikes more effective. But to do all this he must enter a field of more difficult research than the mechanical inventor can ever occupy,—a field requiring the most accurately trained powers of observation and untiring

patience. The mechanical inventor can repeat his experiments every day or hour, but the experiments of the farmer often require not only weeks and months, but years, for their completion.

Chemistry, and the laws of vegetable and animal life, in all their relations to the inorganic world, are the intricate subjects that claim his study now, and will continue to do so while seed-time and harvest remain. Every new discovery in either of these fields may increase the quantity and quality of his products, or render them more certain. And thus, every year, manual labor on the farm will be utilized so as to secure more abundant returns. Into these fields, New England agricultural science has already been driven. While those with richer lands have but to gather crops from soils teeming with fertility, her farmers must master the very *arcana* of science, if they would compete with their more favored neighbors. Every section of the country must, in the main, work out a system of agriculture for itself; but it will be in New England that much of agricultural knowledge will be sought for, when the exhaustion of soils and increase of population make agricultural science the same necessity in the South and West that it now is to us. And New England, sneered at as the land of ice and granite, as not having land enough between her hills for respectable farms, will be ready to contribute of her abundance in this department, as she has in every other department of science and practical art.

When I say that chemistry and the laws of animal and vegetable life are the means of utilizing labor, I do not introduce subjects beyond the power of every farmer to grapple with successfully. It is not necessary that he should become a Liebig in chemistry, nor an Agassiz in natural history. Such men are pioneers, following nature into her dark chambers, but opening the shutters so that henceforth all with common eyes may see what those chambers contain. Accurate scientific knowledge is an invaluable basis for all practical operations.

But agriculture must be mainly built up by accurate observation. You may do something to correct your soils chemically by the direct application of materials. But it is mainly the chemical changes produced in the soil itself, that you must rely upon. You must know what draining, what frequent ploughing, what change of crops, what all possible conditions will do to

prepare the soil for special crops or to secure its general fertility. This knowledge will come from observation and experiment. Simple change of method may so far utilize labor that eight hours may be as good as ten. If turning the furrow in autumn destroys the insect grubs, so that the succeeding crop is doubled, fortunate is the man who knows enough to secure the double harvest, while his neighbor hunts "cut worms" in summer, and lacks bread in autumn. He may not know what species of miller the ravages will produce; he may not even know that they ever do take wings and fly away; but if he knows enough to so cultivate his land that his crops are unmolested by them, he need not trouble himself respecting the length of their *antennæ*, the color of their wings, or the name of the author who first described them.

In the same soil one kind of seed will give more bushels than another for the same labor. The seed and earth, rightly related, will save labor, and give to man more time for rest and enjoyment. The fruitful apple, the prolific grains, the choice flocks and herds, all give richer returns for the time and strength expended upon them. In the very law of plant and animal growth is found the means of constantly increased utilization of the farmer's labor. The plants and animals most useful to man have a wonderfully plastic constitution; that is, they appear under different forms known as varieties. So that from nearly all our cultivated plants and domesticated animals there is the possibility of securing choicer kinds than have yet been known. It is for us to learn all the conditions by which the most desirable kinds are secured, and to be on the alert to preserve them when they appear, that our labor may be turned to the best advantage. What changes for the better have been wrought in New England within the last twenty-five years!

I need not spend time to recount the changes in stock and fruit that have been so marked. And may we not reasonably hope that in this line alone such improvements shall be made for the next twenty-five years that one-fifth more product shall be secured by the same labor than now? If we can secure this result, we have here an important element in human progress, an important condition for the advance of civilization. Leisure will be gained not by stinting ourselves in the necessaries or luxuries of life, but because less labor will be demanded

to secure abundance. This grand law of animal and plant variation, which some have fancied to be no law, but a sort of indefinite unfolding of one specific form into another, is here seen to have special relation to the progress of the human race, a relation so specific that if we recognize a creative intelligence anywhere, we must recognize it in the production of varieties, not only as fitting animals and plants to the varied physical conditions of the earth, but as perfecting their relations to man as a progressive being. We may now have the best kinds known: but five years from now we may have better peaches, grapes and strawberries, better grains may wave in our fields, better flocks and herds cover our hills. Man, capable of unlimited improvement, and with the desire for such improvement, finds nature perfectly adapted to his constitution.

The cultivator of the soil, though among the most independent, like all civilized men has need of the labors of others. He does his part to support manufactures and commerce. They must give him fabrics in exchange for raw materials and such products as his own soil and climate cannot supply. But utilization of labor demands that every product shall be consumed as near the place of production as possible. The finest wheat may grow so far from market as not to be worth the cost of transportation, and the golden corn may become fuel instead of coal. Every mill, every artisan's shop adds value to the farmer's land in its neighborhood. Every product consumed there is saved the cost of transportation. If we must send our wheat to Manchester and Sheffield and bring our wares from them in turn, there is plainly a vast loss in transportation. Every mile a bushel of wheat is carried adds to its cost, but adds nothing to its power to support human life. A bushel of wheat will bring more money in Liverpool than in Illinois where it grows, but it will not feed the laborer one moment longer in one place than in the other. The amount of transportation and the cost of transportation should be reduced to their minimum. And it is time that we should stop reckoning the profits of transportation as additions to the wealth of the country, when they are simply tolls levied upon the consumer. The less of them the better.

When agriculture and manufactures of every kind go hand in hand, the labors of both classes will be most perfectly utilized.

There will still be a vast field for commerce in transporting from land to land and place those products which cannot possibly be supplied upon any one spot. Do what we will, New England must depend upon commerce for some of the necessities and many of the luxuries of life. She must import her coal, her teas and tropical fruits; her mills must be supplied with cotton from a more genial clime. The same may be said of every civilized country in the world: it must seek beyond its own limits for the products peculiar to other lands. But every country is false to itself when it needlessly becomes dependent upon foreign nations that may any day become hostile. And above all other nations in the world, would it be folly for us to pursue such a course as to leave us dependent upon any foreign nation for a single substance, be it raw material or manufacture, that is needful to us for the fullest and most vigorous national life.

Not only does utilization of labor demand intelligence to direct, that every blow may be struck to the best advantage, but it demands virtue in the individual and the greatest simplicity and freedom in our government. Every jail, every prison and almshouse, is a draft upon the honest labor of the community. The criminals, and all who are needed for their keeping, are so many transformed from producers to consumers. Every vagabond must live. Every thief, and every lounger, every one who lives by vice or by pandering to vice, makes more hours of labor and harder toil a necessity for every man who lives by honest labor. Honest laborers must not only produce enough for themselves but they must support the vile. When virtue has so far prevailed that all men work with hand or head, labor will be lightened and the hours may well be shortened.

The curse of war is another great consumer, destroying everything in its pathway,—producing nothing, and yet when invoked for a nation's salvation, we hail it as a blessing, though flames and ruins are the success of its march.

For us as a nation, the brightest future is opening—we have freedom, the first great incentive to labor. With this, there goes virtue and intelligence to render that labor most effective. Wealth must accumulate from our mines of precious metals, but more than all, from the products of our soil. In days of ignorance and oppression and vice, labor must be long continued

and exhausting. But if we are true to ourselves, every year will lighten labor and shorten its hours. And we call upon all those who would lighten the burdens of the working-man, to join with us to secure the conditions that shall double the efficiency of every hour of labor. If every man would do his share and there were no reckless waste of property, the hours of labor would be diminished without the aid of law. Begin, then, first of all I say, to secure the conditions of diminished labor. Every school established, every criminal reformed, every idler made industrious, every plan of sound economy in the household, every treaty with foreign nations that averts the danger of war, every workshop that supplies at home what was once imported, either removes a burden from labor or gives promise of its removal.

See to it, then, that there shall be peace within our borders. It will be long years before any foreign nation will indulge in the costly pastime of measuring swords with us. If we are true to ourselves and the principles of freedom and justice, no more hostile troops will tread our borders till the present generation has passed away, if ever. *See to it* that vice meets a swift punishment, that virtue may enjoy its own in safety. *See to it* that education is everywhere provided for the young,—education that shall guide and quicken industry, that shall enable the farmer and artisan to press nature's forces into their service. See to all this, and you have done what no laws can do; you have made all producers, you have multiplied your powers by the agency of falling water and expanding steam, you have stopped all useless destruction of products. Labor is utilized because every blow is turned to the best advantage, and every product rightly used. It may be impossible to reach such a happy state of society, but it is something to be aimed at. New England is already on the road. She has but to be faithful to the church and the school-house, to her wise system of agriculture and manufactures and commerce combined, and she will continue in the van as she has thus far been.

THE NEEDS OF NEW ENGLAND AGRICULTURE.

From an Address before the Housatonic Agricultural Society.

BY GEORGE E. WARING.

That which most interests the New England farmer of the present day, is to know how he shall keep even with the world. Not how he shall pay his bills at the end of the year and start again from the point at which he started twelve months before, and with a fair chance of standing twelve months hence where he stands now;—but how, as the world moves, he shall move with it; how he shall be in all respects as much better off at the end of each year as the merchant or professional man is; by what means life is to be made easier, more civilized and more human with him as it is with men of other occupations. He is at least eager to know—if he is too old for much improvement for himself—how he may secure the desired benefits for his children.

One thing he may understand at the outset:—what is called the "good old way" will not help him. Indeed, if we measure it by its results we shall see that the good old way is a very *bad* old way; and we shall come to think that it is only when a farmer comes out of the beaten track, and *risks* something, that he has a chance of being to the end of his days, —anything but a sort of human ox, working in his daily yoke, and chewing his daily cud of old-time ideas,—pulling on the "near" side or on the "off" as his father taught him to do in the beginning, and as he has set his heart on doing forevermore. It would be becoming in me, perhaps, to say, in deference to the class of which I speak,—and to continue a fiction that is as old as farming itself,—that I have a profound respect for the sturdy yeomanry on whose brawny shoulders rests the

great fabric of our civilization ; that I consider their occupation the most noble of all occupations, and themselves the most intelligent and the most honorable of all men. If I were not a farmer myself and did not live behind the scenes ; if I did not know the farmer class as well as a boy knows his own brother, then I might fall in with this threadbare palaver, and seek favor through a flattery that would fall far short of deceiving its hearers.

Farming is noble when it is nobly done,—when it is meanly done, it is mean. Whether a farmer is intelligent and honorable depends entirely on himself, not at all on his occupation. In other words, a farmer is not "a gentleman by right of his profession." I have the same profound respect for a good, honest, manly, straight-forward, kind-hearted, clear-headed farmer, that I have for a good, honest, manly, straight-forward, kind-hearted, clear-headed shoemaker, or lawyer, or clergyman. I recognize in each of them the qualities on which the advancement of the world is to depend, and toward which it is the duty of us all to bend our natures,—as much as our natures will allow. On the other hand, when I see a stingy, close-fisted, narrow-minded, pig-headed man, who is jealous and suspicious of all improvement, the fact that he is a farmer does not make him any more lovely in my eyes, than if he were a mechanic, nor can it shield him from the contempt that all meanness deserves, among whatever class it may appear.

It is important that all men—farmers as well as others—should have a fixed and tangible aim, something to work for ; but something which, when they shall have attained it, will be worth the work it has cost.

Now, in the case of the farmer, what shall this aim be ? Mere worldly prosperity, the ownership of broad acres and fat herds, the piling up of stocks and bonds, and the spreading of one's parchment over all the farms of a neighborhood ? All these are, in and of themselves, of no avail to make a man happy or to make him respectable. When they become the main object of life, they are actual clogs to their possessor. At the same time, money, that root of all evil, may be made, when rightly managed, a fruitful soil from which vast good may grow ; and I hold to the doctrine that in the development of the world, money is the best aid to advancement. The work by

which our progress is made is stimulated by the hope of profit. The desire for wealth (much or little according to our ideas) is a wholesome and laudable desire. It is this desire that makes us work; and it is our work that makes us, or that may make us, great.

Work,—real hard work, with head and hands and heart,—this is the key to all success. Head work alone will not answer; neither will hand work alone. The whole man must be thrown into the fight—not recklessly and blindly, but with a well considered judgment. We must understand that the reason why men succeed as merchants or as manufacturers is, that they take advantage of every circumstance that can be made to favor them. They see where their competitors are weak, and there they make themselves strong to outstrip them. They know that it is only in excessive production, in the minutest economy, and in the utmost activity of exchange, that the possibility of great success lies. Everything is done with a tension that an eager desire for gain alone can give. The successful man is bent on coining his success into gold, and all his energies are harnessed to the ceaseless task, as they would not be were he working with any other motive. The farmer, if he would be successful, must imitate the successful men of other occupations. Not only must he work with all his mind and with all his strength, but he must work *for the love of money*, and as only the love of money can make him work.

Modern enterprise takes the form of a quest for material prosperity. In the olden time its form was conquest and military glory. Helpless nations were trodden under the feet of the successful men of the Dark Ages. In our day and in our land, it is not helpless nations but helpless individuals that must fall. In manufactures the helpless men have become operatives; in trade they are broken-down clerks and porters; in agriculture they are the small, hand-to-mouth farmers, who starve a few animals and a feeble crop on their thin soils, and do odd days' work for their more prosperous neighbors. These men—in whatever station of life they may be—are the poor inefficients, who count for just so much as their labor is worth, and nothing more. It is of little use to trouble ourselves about them until they show the energy to wake up and help themselves.

The man who is to be benefited by our efforts, and who is to benefit us in return, is the restless, enterprising man, who has a steam-boiler in his stomach, an engine in his muscles, a galvanic battery in his brain, and a lion in his heart. To such a man we may look for work that tells. No matter whether he is a farmer or something else; he will succeed; and it would be a good short bit of advice to every young farmer to say "Go thou and do likewise."

If only we could insure their following of the advice!

Do you say that this is enthusiasm? So it is—the enthusiasm of money-making. Our energetic man has worked, as only such a man can work—with a consciousness of the good he was doing, no doubt, and with a delight in the doing of it—but with the hope of gain as his most constant incentive. There may be exceptions—men who work to their wit's ends solely for the benefit of the human family; but they are not many, and I would pit a good, reliable money-maker against the best of them in a race to see which should lay the world under the greatest obligations.

Money, after all, is only an expression of the progress that work accomplishes. The freedom with which it is used, and the comforts it secures, mark the solid advancement of our own time. The men of every occupation, taken as a class, are becoming, year by year, more prosperous; there is more comfort, more luxury, more intelligence, more cultivation, less ill-health, less contemptible meanness among them (though this last quality holds its own bravely), than there used to be. The progress is mainly due to the leaders of each class,—men whose wealth has of course added some weight to their example, but where great effect has been produced on the world by their *work*, and by the activity their work has engendered in others.

It would be folly to say that agriculture has not felt and profited by the influence of the same sort of example, or to suppose that there is any cause for discouragement in the farmer's condition. All that I desire is to draw attention to the fact that it is to the influence of *untiring work*,—work done in the hope of gain, done in pursuit of personal wealth,—that we must look for that still further progress that is needed to make New England farming, and, indeed, all other farming, as attractive to the better class of young farmers, as New Eng-

land cotton spinning is to young manufacturers. They must see in it a field for profitable work, a field of good promise.

We can effect no radical change for the better, until we can tie the artery by which our reddest heart's blood is flowing to the factories, to the cities, to the West, to the professions, anywhere to get away from its native field of action. We *must* keep our best young men at home; "keep the boys on the farm" is the hackneyed phrase. Very good! How shall we do it? The old recipe of making home delightful, and teaching the cherub that agriculture is an occupation that has been vastly honored by all generations of men, and is the most certain of all to secure a comfortable old age, and a peaceful death in bed, has been tried a hundred times over, and has a hundred times failed. Our cherub does not want a delightful home where he milks fourteen cows before breakfast, and spends his winter evenings with his overtasked family, in a room heated by a close stove. He cares nothing for the abstract opinion of any generation of men, past or present; old age is too far away for him to heed whether it is to be comfortable or not; and he would not give the snap of his fingers to die in bed. He does not consider dying at all. What engages him now is to know how he shall live; and the sentimental influences that have been tried so long have failed to convince him that he will live as well on the farm as away from it. What your young man wants is precisely what your middle-aged man wants. There is one word that expresses all our desires, or rather a leading desire of all our hearts; and that is, "money." *He wants to be rich.* Whatever form his ambition may take, we can translate it for him into the word "money," and he will resolve it into its equivalent at his own sweet will.

Is it all sordid love of money then? Is there no poetry in farming? To be sure there is, just as there is poetry in all exercise of the mind. There is none in the turning of a damp sod, as the plough creeps under and around it; but what poetry may there not flow through the mind of him who, leaning over the plough-stilts, watches its life-like heaving before it settles to its bed, and rests on its curling edge the feet of a thought whose head is in the skies. The poetry is in the suggestiveness, and there are suggestions, thank God, in every occupation. He is a blind dolt who can go through this mar-

vellous world without finding it at every step and on every side. But our present business is with the more practical side of the case. We want to know what can be done to keep our young men on the farm; to keep Eastern men from emigrating to the West, and to give to all enterprising farmers an incentive for more thorough and more successful work.

We desire to accomplish a practical result; we must adopt practical means. We want to keep our young men in the profession to which they are born; we must give them as strong an incentive to stay as the world gives them to go. If we can show them that in money or money's worth, for every dollar they could make in a factory (after deducting insurance against risks) they could make a dollar on the farm, and that they can make it with as little personal sacrifice, they will no more think of leaving the soil than they will think of leaving earth. If our son thinks he is sure of an income of $5,000 a year if he studies law and devotes the best of his life and energies to the skilful practice of the profession, let us show him that the same study, and time, and skill and energy will secure for him, in comfortable and luxurious living, the full equivalent of his professional income, and we may rest assured that we have nailed that boy to the farm to the end of his days.

Do you ask how we are to show him this? We must point to instances,—which we need not go far to find,—where intelligent and energetic men are actually accomplishing such results, and are making more than comfortable living from their farms. Or, better still, let us show it to him in our own lives and our own business. Let us put a little more energy, a good deal more thought, and a good deal more capital into our farming. Let us sell a little bank stock and use the money to make our farming more worthy of us. Or, even better yet, let us send him away to live a year with the best farmer we can hear of, and give him to understand that when he comes home again, with his mind made up to become a good farmer in sober earnest, he shall lack nothing that our means or our encouragement can supply, to start him on his way. And then, when the time does come, let us be men about it, and really try to make him happy and hopeful in his new pursuit, avoiding especially the most common fault of fathers—jealousy of their sons' movements. Let us slacken the restraint in which we have kept

him as a child, and make him feel as much of the freedom of manhood as he would do had he gone to town to live by himself. Let us exercise the control of companionship, not of authority, and let us try and make the boy a good fellow, by being a good fellow with him. Take away the "stern parient" element and give him at home—within reasonable limits—the same sort of freedom he would have abroad.

There is another branch of our subject that is not less important than the one we have just considered. We must do all in our power to keep the young men in our ranks, but we must not forget to keep our ranks worthy of them. We must waken ourselves up, set our eyes to the front, and march on. We have lolled on long enough in the easy-going way. It is time, now, for us to take up the pace of the other arts and to manage our farms more skilfully and more effectually. Progress enough has been made, in the introduction of the new harvesting machinery, to show that a most radical change is possible, and it is a radical change that we need. It is difficult to define in fixed terms just what the change should be. It depends on circumstances; but whatever it is, it must reach the bottom. Farming must be made a business in which the same educated intelligence shall find employment, that is now engaged in the more attractive pursuits, and it must furnish the same means for refined and elegant living that they furnish. With this change it will become the most attractive of all pursuits, for the simple reason that while it will be as profitable as any other safe business, its prosecution will involve an amount of mental activity and scientific speculation that cannot fail to delight an intelligent man.

We must work for refinement, and elegance, and luxury. It is balderdash to say that we like "plain living and hard work." If we do, it is because we are too poor or too mean to pay for something better, and because we make it a rule to like what is allotted to us. Our children don't like it, and if they can help themselves they won't stand it. Preach to them as you may, they will seek the easiest and most comfortable life that is open to them, as naturally as sparks fly upward.

All this implies not only a radical change, but a radical reform. It is a reform that can be sought by no royal road. It is too radical and too far reaching in its effects on human

economy and on human society to be secured in a moment or at trifling cost. It is not by speeches at agricultural fairs, nor by the resolutions of farmers' clubs, nor by the exhortations of the agricultural press that the work is to be done, though those will all help and stimulate the effort. No real progress will be made until the farmers themselves (in their individual capacity) undertake the work, and undertake it with a will, with a real conviction that there *is* a better way of farming than any they have yet tried; and that their best chance for improving their own condition, for making more money, and for securing their sons as helpers and successors, lies in seeking out this better way, and in devoting themselves to its untiring and unfaltering prosecution.

I have said that if we would improve we must risk something—"nothing venture, nothing have." If you are content as you are, remain as you are, however that may be. Do the best you can in your own little treadmill, and never mind that others are getting on while you are standing still. If you are happy in the simple fact that you make both of your narrow ends meet, and meet at the same point, year after year, far be it from me to wish to disturb your serenity. You have your use in the world: you are a good tally-mark to count from; and the more unmoved you remain, the easier will it be to see how the better men progress. If, on the other hand, you are not satisfied to stand still, but wish to join in the march that is carrying the best men of your time to the highest favor, prosperity and consideration, and which promises as much for you as for any of them, then you must make up your mind to risk something of what you have (as they all do) in order to gain what without the risk it is impossible for you to get. Only be careful to cast your ventures with judgment.

The tendency of enterprising farmers is often to risk too much, or to risk for too uncertain ends. No man can afford to hazard his self-respect, his self-reliance, his hopefulness, his courage; for those imply (among other things,) his *ability to work*. And this is the one thing that will secure him comfort and happiness, and nearly all else that is worth the having, no matter what befalls. Therefore, in every undertaking, he should mark well all his ways, and forecast carefully his chances of success and failure, lest he should bring upon himself needless

loss,—loss that entails discouragement and so takes away the self-reliant and hopeful condition that makes his task easy and effective. Necessary losses hurt no one; but losses that are born of neglect or folly, inevitably bring self-reproach and discouragement.

Let us, therefore, be cautious how we proceed for ourselves, and cautious how we influence others; but let us give our best efforts to the solution of the practical question: In what way are we to secure, with the most certainty and the least delay, the improvement of our condition as New England farmers?

The less we look abroad for help the better. The miracle that is to raise us is the miracle of combined personal effort. No man's single work will count for much, but the work of all shall amaze us by its effect. There is in every town at least one man who feels within him the inspiration of the improvement, who knows that New England agriculture is only feeling the feeblest dawn of its triumphant day, whose heart longs for its great and beneficent possibilities, and who only needs the encouragement of kindred feeling to make him just such a laborer as the vineyard needs. In every county there are many such. In every State there are multitudes. If we can urge these men's efforts into the same channel, they will wash away the barriers that the good-old-way men have built, and will spread their influence over the whole broad land, fertilizing as it flows, and making our hills and valleys to blossom with the flowers of a perfect agriculture,—peace and intelligence and plenty. Let us make among ourselves a brotherhood of "high farmers," and try, by our modesty and by our success, to overcome the greatest obstacle to the improvement of our agriculture,—that is, the opposition of the farmers themselves.

It is a shameful thing to say, but the one cloud that is never lifted from the path of an improving farmer, that is rarely pierced by a ray of hope or encouragement, is the mean jealousy and suspicion—almost the hatred—of his neighbors. The men who have nothing to lose and everything to gain from his course, will, if he is a sensitive man, make his life a burden to him, or drive him back into the ruts their own wheels have trundled so long. It has been my fortune to be a farmer in three different localities. In each, I have made it a rule to do what seemed best, without regard to the opinion of other people.

I have had much to learn, single-handed; I have made mistakes and failures; and I have made successes. Through all, I have never been without friends whose sympathy and support proved an unfailing reliance; but I also have never been without enemies who have done the little they could to make me uncomfortable. Even to this day, when I have grown older and tougher, and have learned to fatten on opposition, and when my relations with my neighbors are friendly, and even cordial, I am sure that the utter and entire failure of every agricultural operation in which I am interested, would carry joy to all their hearts,—not because they dislike me, but because my agricultural operations represent a hydra that has come into their happy valley to consume and destroy them and their wives and children; that is to say, it is in some respects a novelty. If my farming succeeds, then they will adopt it, and ascribe their knowledge of it to the teachings of their grandfathers, but until it shall succeed it is a heresy that is worthy of (and gets) their profoundest contempt—if nothing worse. In all this, my Rhode Island neighbors are not worse than my former neighbors have been, and they are no worse than my Massachusetts neighbors would be, if I were to come and occupy a farm in the Housatonic Valley.

Old-fashioned farmers hate new-fashioned farming. Why they hate it no man can tell, nor need we ask. That they do hate it is too plain to doubt, and it is this hatred more than any other influence, that prevents the more rapid improvement of our agriculture. Our best chance for succeeding against it is to unite our forces, those of us who do not believe that an old-fashioned farmer knows so much that he has a right to cry us down, and to make a stout fight.

I am not jesting. I really believe that the influence of those who cry out against "book-farming," as they call all attempts at improvement, is one of the greatest stumbling blocks that the improving farmer meets in his path; and that many a timid man has been sickened, and deterred from his work by the thought of the ridicule he must encounter from his neighbors, —men who accept to-day what they decried yesterday, but who none the less vehemently decry to-day what we know they will accept to-morrow. We must either ignore them, or we must combine to overcome them. It will be the shortest way to

combine against them, for this will give us an organized support that will be of the greatest value to the younger men, and it is the help of the younger men that we need above all things.

This is a movement that will win as it grows. Its first steps will be faltering and it will be opposed on all sides by the united prejudice of every community. Never mind. Let us try it; we are not fair to our comrades when we leave them unaided in their contests with their neighbors. We must realize the fact that it is our neighbors—wherever we are—who (without really meaning us harm) stand the most in our way, and we must remember that our best allies are timid boys who are still debating the great question of their lives,—to be or not to be farmers. A little help from us may decide them and may secure able heads for our councils, which if we neglect them will turn away to trade and count against us.

To sum up, then: How shall New England farming be made to keep even with the other arts of the day? The process must necessarily be a slow one, but its result is certain.

We must use more capital, more enterprise, and more brains in the management of the business. We must make the first aim of all our work, *the getting of money*, and we must work for it in our farming, as we would do in any other employment. The easy-going way of taking our returns as luck may send them will not answer. We must compel our luck to be good; that is, so far as possible, we must remove the element of luck or chance entirely from our calculations, and study to turn to our advantage influences which, if left to themselves, would turn against us. We must drain our wet lands and manure all our lands. We must not lose the use of a grain of manure, and we must never raise a poor crop, when it would be possible to raise a good one. *We must farm far less land.* Every acre we cultivate costs interest, labor, and seed—as much with a poor crop as with a good one—and we must cultivate only so many of them as we can by thorough work, thorough manuring, and (if need be) thorough draining, make to produce a full profit beyond this necessary cost.

Farming must be made attractive to men of intelligence. They must see what there is in it (and Heaven knows there is enough) to afford profitable employment for their best capacity,

and they must see that good farming will afford them the means for an attractive life.

The best farmers must set the example. They must use their wits and their capital, and their knowledge of the trade, to show what are its capabilities; and this example will call for no sacrifice, for the one thing they have to show is how to make money, and plenty of it, by an improved and intensified system of agriculture. They must calculate well the chances, that they may avoid loss and the example of loss, and then they must venture their money and their time on what their reason teaches them to be advantageous.

If we could really have an "Association of High Farmers" that should make a combined effort throughout all New England, and if this association could induce the good-old-way men to cease from their teasing of all who attempt novelties, we should make a much faster progress. But all such schemes are futile. Our only hope must lie in the quiet efforts of single farmers, here and there, men who will be, generally, neither philanthropists nor advocates, but only quiet, hard-working, hard-thinking men, who are bent on making money from their farms, who have the brains to see that good farming is always the best farming, and whose success will be worth more than all other influences in making it fashionable for all other farmers to follow their example.

We may rail at the good-old-way man as much as we please; there is only one lever that will ever get him out of his old rut; that is *the knowledge that money is to be made by the better new way*. Under the genial influence of "cash profits" the veriest hunkerism of the inland hills will melt like the dew before the morning sun; and our carper shall be a carper no more, forever, but a foremost light of the modern school. All these things he now rails at shall then be familiar habits with him—since his grandfather's time.

THE PROSPERITY AND POWER OF MASSACHUSETTS.

From an Address before the Middlesex North Agricultural Society.

BY GEORGE B. LORING.

GENTLEMEN:—I undertake with diffidence and distrust the task which you have imposed upon me. The appropriate custom of our society, fixed by the constitution, by which the chief executive magistrate of the Commonwealth in which our annual session may be held shall be called upon to express his views of our special calling by public address, has done so much to rouse and elevate the agriculture of New England that its omission naturally fills us with profound regret. And while the discussion of agricultural topics may be easy to us who are familiar with them, I feel that I assume a large responsibility when, unaided by high civil position, I endeavor to perform a service which belongs to one whom the people have clothed with the highest honor a State can bestow.

I speak, therefore, as one of your own number,—as a farmer interested in the development of American agriculture,—believing in the importance of American husbandry, confident in the power of American thought to discover the systems best adapted to a free people, and in the power of American labor to work out, in all its various callings, every social and civil problem which can belong to our material growth, and can affect our moral and intellectual advancement. That you, who are engaged in tilling the soil of New England, have diligently performed your part of this industrial service, the exhibition which is just closing bears witness. The prosperity of these States has suffered no detriment at your hands at least. Equal to the task imposed upon them by severe skies and a rugged soil, superior to the burdens which their patriotic necessities have laid upon their shoulders, diligent themselves in their

calling, and relying with confidence upon the markets of a prosperous community for the means by which their labor shall receive an ample reward, the farmers of New England have kept steadily on their way. Beneath the touch of their hands the earth has yielded her stores with increasing liberality. Submissive to their fostering skill their flocks and herds have risen to a higher standard of excellence and profit. Obedient to an untiring spirit of investigation, they have invoked the aid of science and good learning in their cause, by assembly, and school, and society, and college. And recognizing the mutual relations which exist between all the arts, they have here recognized also and encouraged every form of industry which can adorn and embellish civilized life. To the cultivator, and the herdsman, and the artist, and the mechanic, and the manufacturer, this assembly of farmers has opened the door for competition, believing as they do, that around agriculture as a grand central figure, stand all the efforts which skill and taste can make for the improvement of mankind.

No competitor on these grounds, or in these halls, will expect me to discourse upon his own peculiar interest. I am sure the lessons which you have all learned here by observation are far more valuable than anything I can say. Would you study cattle? Yonder pens, filled with all the most valuable breeds, are your best text-book. Would you know the mechanism which can be profitably applied to agaiculture? The fruits of American ingenuity in every form lie before you. Would you discuss the modes by which the earth can be induced "to pour forth all her secret store"? Ask the cultivators of that luxuriant vegetable growth which must have been your daily admiration in yonder hall. Would you admire the skill with which all textile fibres are wrought into articles of use and beauty? Witness the handiwork of your sons and daughters, and see how the farmer's fireside and the imposing mill join hands in one graceful toil And then turn with me and learn how every powerful and prosperous people develop their own resources, in every variety, as the foundation of their wealth, and strength and cultivation, and financial honesty and success.

This ancient Commonwealth in which we have met, this vigorous and thriving city, which has extended a liberal hospitality beyond the power of any but an industrious and thriving

community, are striking illustrations of the prosperity which attends a wise combination of the producing arts. We who have come up here believe in and are interested in agriculture; they who have so generously received us believe in and are interested in manufactures. And it is as natural, as it is significant, that these two great industries should have united on this occasion, and that each should recognize how dependent it is upon the other for its existence in every well-constituted community. For it is indeed upon the growth of agriculture and manufactures that a nation prospers. They are the strong arms of a people in war and in peace. Paralyze either, and the other becomes comparatively powerless. Our fathers knew this, when, at the close of the revolutionary war, they found themselves a slender people, stretching along the Atlantic seaboard, weighed down by a heavy war debt, and dependent upon primitive agriculture and a feeble commerce for their national resources. Manufactures were small; a few cotton mills in Rhode Island, and the spinning and weaving of coarse cloths of cotton and wool and flax in private families, constituting about all there was of this branch of business until the beginning of the present century. The fatal blow struck at our commerce, at that time, by the belligerent powers of Europe, arrested the attention of all leading statesmen, who witnessed with alarm one more instance in history of the inability of commerce alone to inspire national life and strength. Said Mr. Jefferson then: "The situation into which we have thus been forced has impelled us to apply a portion of our industry and capital to internal manufactures and improvements" Said Mr. Madison, in 1810: "To a thriving agriculture and the improvements relating to it, is added a highly interesting extension of useful manufactures, the combined product of professional occupations and of household industry. Such indeed is the experience of economy as well as of policy, in these substitutes for supplies heretofore obtained by foreign commerce, that in a national view the change is justly regarded, of itself, more than a recompense for those privations and losses resulting from foreign injustice, which furnished the general impulse required for its accomplishment." Said Mr. Dallas, in 1816: "It was emphatically during the period of the restriction system and the war, that the importance of domestic manufactures became conspic-

uous to the nation, and made a lasting impression on the mind of every patriot and every statesman." And not to the great minds of our own country alone does this truth appear manifest. And among others, the Emperor of Russia declares, in 1822, that the encouragement of the manufactures of his empire was imperatively demanded by the agricultaral interest, and also by commerce, and he adopted a policy to that effect, following in this respect the example set by England, Austria, France and Prussia, and adopting that best of all maxims, *the development of every industry for mutual benefit, and for general national prosperity.*

Pardon me for a moment, while I remind you of the growth of our country under the united influence of agriculture and manufactures, before I bring before you the more striking illustration to be found in the Commonwealth where we are assembled. A colonial dependency less than a century ago, the American nation has risen to a free nationality; has increased in population from three and a half to forty millions; has fought, successfully, three foreign, and one civil war; has raised the value of the real estate of the Union from fifty millions to ten thousand millions of dollars; is producing one hundred and fifteen millions of pounds of wool, one thousand three hundred and thirty-two millions bushels of grain: being of corn, 768,300,000 bushels; of wheat, 217,870,000 bushels; of rye, 23,490,000 bushels; of oats, 275,098,000 bushels; of barley, 25,727,000 bushels; of buckwheat, 21,350,000 bushels; besides 67,783,000 bushels of potatoes, 323,724,000 pounds of tobacco, and 2,300,000 bales of cotton. The increase in the value of agricultural lands since 1860, has been in the New England States from 17 to 20 per cent., and in the most prosperous Western State from 100 to 175 per cent.

The growth of manufactures has been not less remarkable and interesting. In 1860 California produced manufactured articles to the amount of $68,253,228; Connecticut $83,000,000; Delaware, $10,000,000; Illinois, in 1865, $63,356,013; Indiana, in 1860, $43,250,000; Maine, $6,235,623; Massachusetts, in 1865, $249,260,700; Missouri, in 1860, $41,783,651; New Hampshire, $37,586,453; Wisconsin, in 1867, $27,840,467; and the aggregate of the Union was $1,150,000,000.

Of the means of communication and transportation, it is sufficient to say that $2,000,000,000 are invested in railroads, connecting the Atlantic with the Pacific, and in the populous States intersecting every county, and in some counties almost every town.

The steady and, of late years, rapid progress of Massachusetts from a purely agricultural community to a community of diversified industry, is full of encouragement to every portion of our country which is becoming densely populated. It is true the business of general farming has declined, and the system of mixed husbandry which formerly supported our people, is no longer profitable. Farms which are so far removed from the markets as not to be adapted to some special product, have fewer attractions than formerly, and do not belong to that system of agriculture which is required by a people whose wealth and activity increase in proportion to their numbers. But of farms like these there are but few. It is difficult to find any large section of the State which is not provided with such railroad communication as to furnish transportation for all farm products. And the lands which are still occupied by husbandmen furnish an ample reward for the labor bestowed upon them. I think I may safely say that we have no industrious farmers who are poor, and very few farms, unless it be those which are in the hands of what are called fancy farmers, which are unprofitable. The homesteads of the agricultural community are in good condition; good houses, good barns and well-tilled fields greeting you on every hand. Farms which were mortgaged ten years ago are now free from incumbrance; and even while the debts resting upon them have been paid, it would be difficult to estimate the amount of money which has been drawn from them in the shape of taxes for general and local purposes, and of contributions to all the charitable objects of war and peace. The tillers of the soil here are generally prosperous, and the labor employed by them is well rewarded, while around our numerous large towns and cities is gathered a rural population whose comfort and intelligence is unsurpassed by any similar population on the face of the earth. From the cranberry meadows of Barnstable, and Plymouth, and Bristol; from the market-gardens of Essex, and Middlesex, and Worcester; from the tobacco lands of the Connecticut Valley;

from the fruit gardens of Norfolk, and from the dairies of Berkshire, there is constantly gathered a liberal return. And I am confident that the condition of the agriculture of Massachusetts is highly encouraging to those who believe in large home markets, and in the careful and intelligent cultivation of the soil which is requisite to supply their demands.

Nor is this all. The prosperity of Massachusetts, as well as her enterprise and industry, the result of various industries acting upon each other, deserves more than a mere passing notice from a society like ours, whose business it is to encourage the practical energy of New England. For, to us at least, these States are one, and the radiance of any star in the constellation indicates the quality and opportunity of all.

I need not remind you what she did in the war, and how well she did it. From the choicest of her sons she offered up her sacrifice, and of a male population of 257,833 between the ages of fifteen and forty at the outbreak of the war, the total number who served in the army was 153,486. Her expenditure of money for the defence of the Union out of her State treasury and from her towns and cities was more than $50,000,000. And she can properly boast that through the means of her public and private munificence, her soldiers were well equipped for the battle-field and were provided with every possible comfort and consolation under the suffering and sickness of the hospital and the camp. Nor has her liberality in this direction ceased with the war.

In his last annual address Governor Claflin says: "Within the last eight years more than twelve millions of dollars have been paid for the relief of disabled soldiers and their families, and the families of the slain. In addition to this, more than sixteen millions (16,000,000) of dollars have been paid in bounties to soldiers since 1861. Surely no one will complain of the burden of the debt when so large a part of it has been contracted for the relief of those patriotic men and their suffering families." And over half a million of dollars has been collected through the office of the surgeon-general and paid over to the soldiers and the widows and orphans of those who fell in the war—a charitable provision for their benefit equalled only by the National Asylums under the charge of one of your most distinguished fellow-citizens.

And now of her efforts to improve her material condition by all the arts of peace. More than thirty years ago she commenced a system of public improvements, by loaning her credit to the enterprise of her citizens; and the fruits of her wisdom in this respect are before us. In 1830, before a railroad was running within her limits, when her agricultural and commercial wealth constituted nearly all her resources, her valuation amounted to $208,360,403. In 1840, while her railroad system was yet in its infancy, and the effect of her loans was yet doubtful, her valuation had increased to $299,878,327. In 1860, however, under the influence of her public liberality and her private enterprise, the valuation of her property increased to $897,796,326; in 1865, to $1,007,000,000; and in 1870, to $1,417,127,376; and all this with a territory not much larger than some of the counties in the great States. Of the products of her industry, Governor Bullock remarked in his first annual message:—

"I am enabled to announce to every holder of a Massachusetts bond, whether at home or abroad, the fact that while the first report indicated an annual product of eighty-six millions of dollars, the second of one hundred and twenty-four millions, and the third of two hundred and ninety-five millions, the fourth and last exhibits an aggregate of five hundred and seventeen millions. And this result is yet more gratifying and no less remarkable when it is remembered that the increase of seventy-two per cent. on her production in the last decade has been attained with an increase of only three per cent. in her population."

The indications of prosperity witnessed everywhere are not less remarkable than these. Under the hands of her citizens towns have been directed into profitable labor, her hillsides and her valleys have been adorned with the architecture and landscape gardening of a prosperous and discriminating population. Her busy and thriving villages are a constant source of admiration; and he who knows them best will find it difficult to determine which to admire most, the evident wealth of her thriving citizens or their devotion to all measures of social reform and their high domestic virtues. This increase in valuation and resource, this constant struggle for material as well as moral and intellectual advancement, are so equally and generally

diffused that no section or county of the State can claim peculiar honor in this respect. But I will venture to call your attention to the remarkable increase of population and wealth in certain cities and towns in the Commonwealth, which indicates not only the extent of our prosperity, but also in certain instances, the power of an industrious laboring people to rise to individual wealth as well as to generally diffused competency. I refer especially to such places as Lynn, and Worcester, and Springfield, and Fitchburg, whose prosperous citizens laid the foundation of their wealth with their own hands, and set an example which every honest, and industrious, and prudent man can follow with success.

Increase of Population and Wealth in certain Cities and Towns.

CITIES.	POPULATION.		VALUATION.	
	In 1860.	In 1870.	In 1860.	In 1870.
Lynn, ...	19,083	28,233	$9,299,128	$20,927,115
Lawrence, . . .	17,639	28,921	10,015,503	17,912,507
Worcester, . . .	24,960	41,107	17,626,453	34,018,450
Springfield, . . .	15,199	26,705	8,669,806	24,914,050
Fitchburg, . . .	7,805	11,260	3,762,529	10,373,403
Fall River, . . .	14,026	26,766	10,923,746	23,612,214

Attending this growth in wealth and population there is an ardent desire to cultivate the popular mind, to establish the best systems of charity and criminal reformation, to inquire into and fix if possible the laws of health, to investigate all social and civil problems, to ascertain the best organization for travel and transportation, to suppress crime and to encourage virtue, to develop agriculture, and to preserve for every emergency the martial spirit of our people. And so her prisons and charitable institutions, her schools and colleges, her agriculture and military, are all fed by her bounteous hand. To the work of education she is especially devoted. In peace and in war she has never faltered in this great enterprise of popular education. During the heavy drafts on her treasury at the time of the rebellion, her expenditures for education steadily increased. And when peace came, with its accumulated indebtedness, the schools received, if possible, still more earnest care. Last year the

increase of scholars in our public schools was over ten thousand; and the amount raised by taxation for schools was larger by more than two hundred thousand dollars, than during any previous year. The devotion of two millions of dollars by an individual benefactor, Mr. George Peabody, for the diffusion of knowledge in the West and South-west, has excited the admiration of mankind; the amount expended by Massachusetts in one year as her annual contribution to the cause of learning, was larger than this by more than five hundred thousand dollars, being $2,574,974.49, in her public schools alone. In addition to this, her colleges have been liberally supported; and it has been estimated that her sons have bestowed more than a million of dollars in private subscription, and bequest, and donation for educational purposes upon the fortunate recipients of their bounty. I congratulate this republic of ours upon the energy which Massachusetts has displayed in this work of education. Starting forth as she did with a high standard, her institutions of learning have increased in number and prosperity, until she has literally become the nursery of education and educated men. In the advance guard of civilization as it travels westward, may be found her young men, graduates of her schools, prepared to plant the New England school-house within the fortifications and palisades of the frontier. Within her limits, no branch of science, or thought, or speculation, or education goes unexplored. And when from the schools of the Old World, the energetic and enterprising scholar turns his eye towards this country, as towards a new field for investigation, and looks for that spot where he may find a genial atmosphere, and the best fraternity of scholarship, it is Massachusetts which presents the most alluring charms. I cannot forget the encouraging and flattering fact that Massachusetts presented the most attractive home for Agassiz when he determined to bring his scholarship to America.

I trust, gentlemen, that those of you who have come from beyond the borders of Massachusetts to take part in this admirable exhibition of the products of agricultural and mechanical industry in New England, will not imagine that I am blind to the high and honorable record of other States. I am not. I am aware that Massachusetts does not stand alone. As one of the family of States, she shines for others and they for her.

But I do think she is entitled to the encomiums bestowed upon her long ago by one of her most distinguished sons. "The ideal of a State is no longer one whose population, whether on the Merrimack, or on the Connecticut, or by the side of the sea, is disproportionately engaged in agriculture, and therefore without that variety of pursuit which furnishes the wholesome adjustment of demand and supply. That is now regarded as a State, of high and complete development, whose producing capacity keeps pace with its consuming capacity, its production always suggesting and supplying its consumption, and its consumption at every stage of increase exciting production; thus maintaining within a laboratory of demand and supply, and carrying on without a free and profitable exchange of products that blesses alike those who give and those who take; not impoverished whenever a single staple shall fail or shall not be wanted; independent alike of a surplus around the Caspian or a famine in Ireland; generating new forms of want (for he who creates a new want is a public benefactor); therefore opening a way to new modes of labor, and interlacing the social system with a network of mutually dependent interests and classes; saluting the buyer and seller of other States with the symbols of its commerce; musical in all its borders at home with a machinery which in constancy and power transcends even all human hands; and finally, holding all the ranks and all the departments of our social being in full sympathy with an intelligent and vitalized agriculture which furnishes to them all the breath of life. Such, I venture to state, is the form and precedence which labor takes under the highest development of our civilization. Such a condition is the result of so simple a cause as the classification and separation of the occupations of men, initiated in the first instance in Europe by the introduction of the useful arts, and already become the striking feature of our own community. If we were searching for the nearest approximation to such a model State in this country, I suppose we should be authorized in accepting the judgment of our neighbors and naming our own Commonwealth."

I trust the day is not far distant when this ideal will be realized, and when the agriculture which should be developed in a busy and thriving community like ours will keep pace with its kindred arts, and not in here and there a section, but through-

out the Commonwealth, will accomplish all that is required of it. And this I desire not for crops alone, nor for mere profit. Our means of communication are such that the lands of this Commonwealth are available throughout almost its entire length and breadth; and they should be occupied by those who are employed in the daily toil of our large towns and cities. Every man has a natural desire for a homestead; and here in New England the associations and influences which go with it are as conductive to moral health as the care of the land is to the physical well-being. While we are endeavoring in every way to instruct our young men in agriculture, and to develop the wealth of our community by devotion to the business of farming, may we not also secure increased happiness and comfort for those employed in daily labor, by tempting them away from narrow streets into cheap and attractive homes,—into that best of all material possessions, a house and land.

I allude to this form of occupying the land with the more feeling, because I know that amidst all our changes of policies, and industries, and enterprises, and wealth, amidst all the shifting scenes which diversify the face of American society, and from which no man and no man's children are excluded, there is one element which remains fixed and unchangeable—and that is a demand for independent, aspiring, educated labor. Nine-tenths of our people, perhaps more, are toiling, on the land or on the sea, in the workshop, in the professions, in all educational institutions, to furnish themselves and their families with subsistence, to create the material wealth of the community, and to elevate and refine and organize and save society. To the productive and cultivating power of these classes, everything stands secondary. To them, every avenue is open. From this great multitude spring, in succeeding generations, the foremost men, who accomplish for us in every service, the great results. It is our laborers who become our inventors, anxious to relieve the burdens and quicken the capacity of toil. It is they who, step by step, advance from the simplest details and commonest services up to the highest positions in all the great enterprises which make up our busy life. They build, and organize, and rise into the control of our railroads. They conduct our mills. They guide our ships. They open the paths for the capital they create. They fill our schools. They apply their ingenuity to the soil.

They legislate for us. They rise into the highest seats of power. The farmer's boy, to whom neither academy nor college was ever opened, spends his youth in clearing the forests, and his manhood in guiding the councils of his country through a great war, dying a martyr to the cause of human freedom. A young village merchant becomes secretary of the treasury, and upon his integrity and sagacity, the country implicitly relies. The highest judicial officer of the land once labored in the soil. From our workshops and farms sprang the heroes of the war. And all over the land stand the tasteful and elegant abodes of those who toiled with their own hands to lay the foundation of their prosperity,—of those who have not forgotten to cultivate themselves as they have progressed, and who remember liberally the intellectual, the moral and religious wants of the rising generation. How the sons of our working-men strive for the high places! I have not forgotton and I shall never forget that boy from the State of Maine, whom I found in my early life on his way to Boston, in search of labor and distinction. He had left his home, two hundred miles away, had dropped a tear as he took his last look of the old familiar spot, and humble too, where were his father and mother, and his two brothers and sisters, as he told me, and where were his few well-read books, to become a Boston printer; because he learned from these books that Benjamin Franklin was a great man. He was barefoot, and the miles had been long, but his courage had not failed: and as I took him into the great city, and found him occupation, I learned the intelligence, and ambition and energy which inspire the sons of New England labor.

It is because labor thus lies at the foundation of society, is the fountain from which all life springs, and comes so close home to us all, that we regard it in this country with such tender care. To educate it, all the schools are open. To elevate it, all the rights and privileges of citizenship are laid at its feet. In many of the occupations its reward is ample, and it should be so in all. The laborers upon the land in all the Northern States to-day are well fed and housed, and share largely with the landholders themselves the profits of the soil; and these laborers constitute four-sevenths of the aggregate labor of the country. The numerous persons employed in domestic service, sharing as they do our dwellings with us, are receiving a gen-

erous reward for their labor. The savings banks in all our prosperous manufacturing towns, are receiving large deposits from the operatives—these deposits increasing in one section, from $34,934,271 in 1860, to $99,147,321 in 1867; and in another from $18,132,820 in 1860, to $31,234,464 in 1866. Mechanics and artisans, working singly or in groups, in many occupations find a liberal compensation. Here and there employers are setting a noble example of coöperation, by sharing with their employés a percentage of the net profits of the business in which they are mutually engaged. And while in some branches of business the uncertainty of continuous labor, and inconstant and insufficient remuneration, are a cause of great anxiety, the best mind of the country is striving earnestly and incessantly for the amelioration of those trials which, coming home to the family of the laborer give a sting to his toil to which no industrious member of a free and prosperous community should be exposed. Labor, in our country, should mean the power of providing, by diligence and industry, a comfortable subsistence and an honorable position. It means all the civil opportunity of which I have spoken. It means the possession of a home in which want casts no bitterness and no distress. It means an opportunity for every man to get a living, and to advance into an enlarged sphere. And when we remember that there are those now in our country who are earning with their hands the means of owning their homesteads, educating their children, ornamenting their dwellings, clothing themselves and their families so that a public assembly of our laboring population in its best attire is a delight and an encouragement to every lover of humanity;—when we remember all this, we can understand what the opportunity and standard of American labor are. And when we remember, also, how this standard has advanced by the nature of our institutions, and by growing liberality of sentiment, within the last quarter of a century, and how the most intelligent and humane employer comprehends his responsibilities and relations, we cannot but anticipate for this country a just and generous solution of that question which has tried the profoundest thinkers of our day.

It is to maintain this standard of labor in America that the most anxious thought is now devoted. The influence of our free institutions is already felt abroad; and while our system of

government is but half understood, the fact of our free citizenship has worked its way into the depths of the popular heart, and occupies the thought of the most liberal statesmen there. If we expect the status of our labor to attract attention, we must enable it to hold its position. We need not go to others; but others come to us. And wherever we desire to open unrestricted commerce let the genius of our constitution precede the genius of our trade. That the day is coming when our territory is to be enlarged, I cannot for a moment doubt. The peaceful annexation of Canada to our northern border I believe to be a growing necessity, both for herself and for Great Britain; and I know well how readily our people would rejoice in the establishment of a reciprocity with that colony, which is based upon one nationality and one flag. And when our sway shall be thus enlarged, our great design will fail unless we carry with us a system of intelligent, dignified, well-requited labor.

How, as we contemplate this great land which is our inheritance, do the obligations which go with it weigh upon our hearts, now, more than ever, under the law of universal freedom. You and I rejoice in the dignity of independent manhood. To no man should this joy be denied. Whatever of prosperity, whatever of cultivation, whatever of refinement and education, whatever of that comfort and repose which carry joy into our housholds, and good order into our communities, can be secured by wise and enlightened labors, let us do all in our day and generation to secure it. New England has done much for the glory of the land. And when she calls upon us, her sons, to maintain those principles upon which her greatness rests, to what a host of prophets and wise men does she point, as our teachers and guides. As they believed in education, in social and civil equality, in a wide-spread prosperity as the foundation of a well-ordered community, in the power of a proud and honest people, so should we. Rejoicing that the trials of their day are over, and that we stand upon a common soil dedicated to one high and humane civilization, I appeal to you to cherish the institutions which they transmitted, and to hold high the American system of government and society, as the banner under which all the sons of toil shall find justice and protection.

NOTHING NEW.

From an Address before the Norfolk Agricultural Society.

BY SAMUEL B. NOYES.

About forty years ago, when the city of Boston was comparatively a small village, on Court Street, near the head of Hanover Street, in a room in an old-fashioned building, to which you descended by a wooden step, Robert New—"Bob" New—kept his barber-shop. He was a pretty old man, and his customers, who, in those days made the barber-shop a sort of exchange, where they learned the gossip of the town, used to call him "Old New." By-and-by it transpired that the barber had a son born in his house, and the curiosity of his customers was great to know what he would christen him. So for some days they asked him, "What do you call the boy?" "Nothing," was the reply; and so the child went by the name, "Nothing New." And if you should ask me what can be said here to-day in this presence, which is new, I should answer—nothing. And my theme may well be called "Nothing New."

It seems to me that you can consider no subject to-day of more importance than to know how the interest of the people of this country in this society, formed under such glorious auspices, can be heightened, and increased, and extended. Every farmer in the county of Norfolk should be as enthusiastic in its continuance and support to-day as they were who established it. There may be town societies, or smaller district societies, but these should be subsidiary to, and branches of, this society, as county societies are parts of State societies, as State societies are tributary to the New England Society, or to a National Society. It is a local interest we need.

We need not fear that the human race will ever cease to have a delight in the cultivation of land,—the raising of grain and fruits and planting trees. Men always did delight in the pleasures of agriculture. It has been the chosen pursuit of

the ablest and wisest men in all ages. The pleasures of the husbandman have been the theme of poets and orators in every language and in every land. These pleasures, Cicero tells us, are not checked by any old age, and make the nearest approach to the life of a wise man. And he tells us that Homer introduces Laertes, soothing the regret which he felt for his son, by tilling the land and manuring it.

Marcus Curius, after he had triumphed over the Samnites, over the Sabines, over Pyrrhus, spent the closing period of his existence in agricultural pursuits.

Cincinnatus was at the plough when it was announced to him that he was made Dictator.

"God Almighty," says Lord Bacon, "first planted a garden; and indeed it is the purest of pleasures; it is the greatest refreshment to the spirits of man, without which buildings and palaces are but gross handiworks."

Addison says a garden was the habitation of our first parents before the fall. It is naturally apt to fill the mind with calmness and tranquillity, and to lay all its turbulent passions at rest.

The philosopher Bolingbroke was never so happy, Pope tells us, as when among the hay-makers on his farm.

And not alone in the refinements of rural life will there be an interest. Farmers hold the world together. There may be years when they seem to be of less consequence. Trade or manufactures may allure some of them for a time. But there will ever be latent in every man's breast a hope to end his days on a farm. Then we need not fear but that there will always be farmers in Norfolk County. Every diminution of its territory by which some of its oldest and most glorious farms are consigned to the city to be covered with dwellings, will but make those which remain to be more affectionately regarded. And in a county like this, whose territory is growing smaller every year, the farmers can in many ways subserve their best good by a union for the support of this society. How otherwise shall be controverted what I have so often heard said in other States of the Union, that the old farms of New England, more particularly of Massachusetts, are passing out of the ownership of the descendants of the families who first cleared the fields and fenced them, and planted the orchards, and

builded the barns and the farm-houses, and planted the shade trees which overshadow them.

Alas! it is too true, as any one can know who travels through the Massachusetts towns, not on railroads, but by the old town and county roads. When I have been driving about the country, I have paused more than once to contemplate the desolated appearance, the forlorn aspect of some of these ancient farm-houses. They were not, perhaps, what the architect of these days would call beautiful, yet they were like the houses which Socrates would have called beautiful. He reasoned on the subject thus:—"Should not he, who purposes to have a house such as it ought to be, contrive that it may be most pleasant, and, at the same time, most useful to live in?" This being admitted, he said, "Is it not then pleasant to have it cool in summer and warm in winter?" When his hearers had assented to this, he said, "In houses, then, that look to the south does not the sun, in the winter, shine into the porticoes, while in the summer it passes over our heads, and above the roof, and casts a shade? Ought we not to build the parts towards the south higher, that the sun in winter may not be shut out, and the parts towards the north lower, that the cold winds may not fall violently on them? To sum up the matter briefly, that would be the most pleasant and the most beautiful residence in which the owner, at all seasons, would find the most satisfactory retreat, and deposit what belongs to him with the greatest safety." As if they had brought the art of building from ancient Greece, so did our ancestors construct their houses on a southern slope, fronting to the sun, high in front, and low in the rear. We used to hear them called "salt-box houses"; for in every one of these houses there used to be a salt-box, shaped precisely like the house.

I am not to be reckoned among the oldest persons here today, but I have seen many of these New England farm-houses; and comfortable, inviting places they were. There was the long kitchen, with its broad, deep fire-place in which a half-cord of wood could be piled and fired on festive nights. What suppers, what sports there were after a spinning bee, or a quilting bee, or a corn husking! What Thanksgiving feasts! What birthday rejoicings, what wedding festivals, those old kitchens witnessed! The fire on the wide hearths never went

out. And all through the winter months, when the crops had been housed in the barns and stored in the cellars, joyful among themselves, as Virgil has it,—the farmers enjoyed mutual feasts.

There was little of what is called rivalry or envy in those elder days among the farmers. There was a general harmony and good neighborhood. The interest of one was the interest of all. Did one of them have the misfortune to have his house or his barn burnt, his neighbors would raise and finish a new house or barn for him. What famous women were the wives of the farmers who lived in those houses! How they rose up early and sat up late, and carded wool and flax and spun yarn and knitted stockings and wove cloth! And they made butter and cheese; and they raised up sons and daughters all the while. Verily, as Mr. Alexander Everett once wrote, there should an order go forth for a Solemn Bee to assemble in every State in New England with a view to ascertain and preserve the oral traditions of the customs of our ancestors, of the farmers of the early days of our State.

There were cities in those days, and the line of demarcation between town and country life was sharply drawn. Mr. Boutwell, at the dinner at the last New England Agricultural Fair at Lowell, spoke of the time as past when a man from the country would be known and distinguished from the inhabitants of the city the moment he set his feet in State Street. And here is seen our connection with the great Past. It *was* so in ancient Greece. As Athens grew in wealth, the richer part, indeed, of the country population were more and more attracted to it; and Isocrates, writing almost four hundred years before Christ, can already contrast his own time with the days when "the houses and establishments in the country were handsomer than those within the walls, and when many of the citizens did not even come to town for the festivals." But there remained a frugal farmer class, strongly conservative of the old simplicity, totally strange to the life of the city, and rarely, in some cases never, visiting it. In the Greek Comic Dramas the temptations which beset the rustic on his visits to Athens are forcibly described. A farmer sends his son to sell wood and barley; the young man sees a philosopher at the Academy, and to his father's dismay comes back a Cynic.

Another, having been sent to buy earthen ware, is betrayed into a ruinous carouse; a third, after disposing of his figs and nuts goes to the theatre, and is thrown into ecstacies of wonder and terror by a conjuror. The rareness of such visits is also marked. In one letter a young Attic farmer requests a neighbor to be his guide in a *first* visit to Athens; he longs to see what this thing may be which they call "town"—we call it the elephant. In another a son implores his mother to "come and see the splendors of the town before her dying day"; for though distant but a few hours' journey she has never seen them. Another writer tells us how the rustic may be known, for he will carry the fragrance of a posset made with wine, barley meal, grated cheese, and honey, flavored with thyme, on his breath into *Ecclesia!* And we are told of one Cleon, a villanous Athenian trader, who sold bad shoe leather to the country people, "so that before they had worn the shoes a day they were too large by a couple of spans."

So far as there is any known written history of the transactions of the human race on this earth, *there has always been a country, and there has always been a town!* "God made the country, and man made the town." And in the ancient farmhouses of this county were cultivated and cherished the divine graces of character. First of all, piety; humble trust in God.* By patient, industrious labor, they cleared the fields of their forests, they gathered the rocks and stones into walls, they con-

*NOTE.—1646. "This year, about the end of the 5th month, we had a very strong hand of God upon us, for upon a suddaine, innumerable armys of caterpillars filled the country all over the English plantations, which devoured some whole meadows of grasse, and greatly devoured barley, being the most growne, and tender corne, eating of all the blades and beards, but left the corne, only many ears they quite eat off by eating the green straw asunder below the eare, so that barley was generally half spoiled; likewise they much hurt wheate, by eating the blades off, butt wheate had the lesse hurte, because it was a little forwarder than barley, or harder and dryer, and they lesse meddled with it. As for rye, it was so hard and near ripe, they touched it not. But above all grains they devoured oatss. And in some places they fell upon indian corne and quite devoured it, in other places they touched it not. They would crosse highways by 1000.

"Much prayer was made to God about it, and fasting in divers places, and the Lord heard, and on a suddaine took them all away again in all parts of the country, to the wonderment of all men. It was the Lord, for it was done suddainely."

"1662. It pleased God this spring to exercise the country with a severe drought, but some were so rash as to impute it to the sitting of the Synod. But God was pleased to bear witness against their rashness. For no sooner was the Synod met, June 10, but they agreed to set the next day apart to ask God's favorable presence and to ask rain; and the day following, God sent raine from Heaven."—*Ellis' History of Roxbury Town, pages* 75, 76, 77.

structed the rude bridges and the highways, they planted the fruit trees; their houses were nurseries of pious sons and daughters. In them there was plenty and there was peace. One generation after another inhabited them, or came back to them on holidays to renew their early associations, at the old homestead. And why not continue the custom? Why should you allow these old farm-houses to go out of the family name,—to be demolished, to fall to pieces from decay? Why is it that these ancient temples of godly piety, and of all rustic virtues, are falling to ruin?

There are crises in the life of almost every man who lives to middle age, which are sad. As when a man parts with his homestead. If he has laid out the grounds, builded the house, planted the trees, trained the vines,—if his wife has watched the growth of the flower beds, and with each returning spring has given to the sunshine and the summer showers the plants which she has guarded within doors from the cold of winter;—there is something inexpressibly sad in this.

But it is sadder far when a man parts with an old farm which has been the homestead of his family through many successive generations, and it passes out of the family name or falls into ruins! You have seen this—you have stood by the front door of one of these old farm-houses when the last owner was borne out by his neighbors to return no more. You have looked eastward, southward, westward, northward, over acres of tillage, orchard, woodland, which he had added to the acres which had come to him from his paternal ancestors, and you have then recalled with what anxious care he had guarded these acres, with what watchful thrift he had added to them and had extended his bounds, building walls and fences, ditching and draining, and enriching the old pastures,—increasing his crops and his flocks and herds. Conservative in his frugal industry, holding the world together while all about him there might be changes, and you have been ready to exclaim as you looked upon the old house,

> "Say, ancient edifice, thyself with years
> Grown gray, how long upon the hill has stood
> Thy weather-braving roof, and silent marked
> The human leaf in constant bud and fall;
> The generations of deciduous man
> How often hast thou seen them pass away?"

This preservation of the old farm need not hinder the increase of the number of towns. There are thousands of acres of land yet in this State, enough of these acres in this county, which are now comparatively unproductive. These can be populated, and the farmers will lose nothing thereby. They will rather gain.

Here is the town within whose limits we are to-day assembled; it is not perhaps on the map of the State, but it numbers more than five thousand souls. Fifteen years ago it had no name; it was hardly begun. Three or four men came out here, and walked over this territory, where nothing but pine trees and stunted oak trees were growing, where cows could be pastured for sixteen dollars a season; and they said let us build here a town; let us make a place where the crowded residents of the stifled lanes and alleys of the city can have homes, where they can breathe the pure air, scented only with the fragrance of green grass and the wild forest flowers. Some of us know what opposition they encountered. We can remember and recall how the "conservative" element of the ancient town adjoining banded itself together to resist the establishment of the town of Hyde Park.

But the town was established, and the men, who, shut up in the city, sighed for the country, with which they had been familiar in their youth, came hither and built their houses and brought their families. I have no doubt that each man will tell you that his first motive for coming was to have a bit of land, a sort of farm with which to solace himself. And it was not the farmers who opposed the building of this town. It was rather those who, while they might have been large land owners, hesitated about helping the breaking up of the local centres of business, which they foresaw must inevitably follow.

And yet, not alone by keeping alive these unions and friendships can our farmers prosper.

It is to the man who works that success comes, in any vocation. And I see before me many men, the secret of whose success in amassing fortunes is a matter of mystery to some of their fellows, but which is no mystery to those who know how untiring has been their industry; how adventuresome has been their labor; how, in the new, and, before then, untrodden deserts of the western world, they have labored to construct the

means of travel, of intercommunication; how they have tunnelled mountains, bridged rivers, filled up valleys, opened new avenues for the outlet of the pent-up industry of the crowded portions of the country, and have created wealth by bringing into cultivation millions of acres of virgin soil, covering them with the vine and grain and untold herds of cattle and sheep and horses, gathering villages and towns and cities, rearing school-houses and churches and factories! These new places are tributary to the support of the older portions of the country.

A Massachusetts farmer need not be troubled nor repine at his hard lot when he looks upon the mammoth corn and squashes and pease and peaches which are produced in Kansas and California and other new States. Size is power, other things being equal. The big tree of Calaveras county, California, one hundred feet higher than Bunker Hill monument, whose first branch is two hundred feet from the ground, excited the wonder of our distinguished friend, as he told us last year, but I never yet heard him say he would like to see such a tree growing on his plantation. So at the great fair at Lowell, the other day, they who looked upon the fat woman who weighed a thousand pounds, were none of them desirous to take her home. It is not by the size of the farm so much as it is by the labor and manure bestowed upon it, and its proximity to a market, that its profit is determined. I have seen on a farm in California a thousand bushels of pease lying on the ground to be devoured by pigs, or to rot, because there was no better use for them. A farmer in Norfolk County would know what to do with them.

It will be a long time before these wonderful farms of which we hear and read, and which some of us have seen, will become of that homelike character belonging to our New England farms. I have travelled over one of those famous farms. Its extent was 71,000 acres. It took two days to drive through it, stopping as we went and returned, to examine but seven of the butter manufactories; for the farm was divided into twenty-one dairy farms, for the manufacture of butter. To each farm was allotted between sixty and seventy cows. The buildings were furnished, and the farm and the cows were leased to the farmer for $25 a year.

But the owner of this immense plantation, and of more than

a thousand cows, with oxen and bulls and young cattle and sheep and horses, in like proportion, did not live upon his farm; and in no one of the farm-houses did we see a woman. There was no home about them. I have wandered many days and many miles with other New Englanders over the plains of Florida, whose soil will produce all the grains and the semi-tropical fruits with almost no labor, and we used to say that we would not exchange a farm of sixteen acres in the most barren part of Massachusetts for the whole State of Florida.

Mr. President, it is an unmistakable proof of the dignity of all pursuits and of labor in any way connected with agriculture, that the interest in these farmers' festivals never ceases, never decreases, but continually grows. We all feel that it is the farmers who hold the world together. Without them the manufactures would cease; without the men who raise the corn and oats, and all grains, and raise the cattle, commerce would languish, and the ships which now cover the ocean would rot at their wharves. Farming is the labor of most of us in early days, and we delight to return to it in old age. There is an indescribable pleasure in these farmers' gatherings; there is an excitement in the sight of fat cattle, and flocks of sheep, in roaring Durham, Devon, Hereford, Ayrshire or Jersey bulls, and the meek-eyed heifers of the various breeds, in the prancing of fiery-mouthed stallions and fleet-footed mares—rulers of the turf—which moves us and sends our blood hilarious through our veins;—there is a never wearying delight from the exhibition of vegetables and fruits and flowers;—and may we not be assured by this day's success that the old Norfolk Agricultural Society has yet a brilliant future and a permanent place in the affections of the people of this county!

FARMING AS AN OCCUPATION.

ESSEX.

An Essay, by CHARLES J. PEABODY, of Topsfield.

In writing on this subject, I cannot give the experience of a long life, as could many of my brother farmers. I bring an earnest love for the pursuit; and as my attachment to it has increased from childhood up, leading me to choose farming as my business, I offer some suggestions as to the best way of managing farm matters, with a consideration of some of the conditions of success in the occupation, and a discussion of a few of the more common objections to farming as a vocation.

When one selects farming as a *business*, he of course understands that as much money cannot be made as in many other pursuits.

I, however, believe that enough can be made to procure all things needful for a good living; so none need be deterred from following it, if they understand the business, through fear of want.

If one is not *born* to the pursuit, it will take a long time for him to learn *all* about the care of the farm, or enough of the varied operations required to make it pay.

It has been well said, that probably no *mechanical* pursuit demands so much knowledge for its successful prosecution as farming.

This may at first seem strange, but when we think of the many things a farmer *must* know, such as the nature of the soil of different parts of his farm, and how to remedy any deficiency that may exist, so as to adapt it to the wants of the crops he wishes to produce; the methods of culture required by different crops; the most advantageous way of disposing of them; the care of stock and of farm machinery,—for in these days of high labor, few can afford to do by hand anything that can be

done by a machine,—we have outlined a business that demands a mind clear and well-informed, a strong arm, and a stout heart.

Of the other conditions of success I should place first, a steady pertinacity of effort to make things better than they are; a man should have ever before him an ideal farm, perfect in all its appointments, to which his actual farm should be made to approach as nearly as may be.

This will keep him out of the ruts, and incline him to progress, in every department of his business.

One should also keep informed as to the relative value of crops he can raise, for at present great changes are going on in the prices of staple articles of farm produce, and he is wise who takes advantage of the market to grow those crops that will sell to the best advantage. At the time of this writing hay is worth in Salem $38 to $40 per ton, and corn can be bought for from $34 to $36 per ton. It does not require much reflection to see that it is much easier and more profitable to raise and sell hay, and buy corn for use on the farm, than to produce the corn.

Yet many men raise as much corn as ever, because they are accustomed to do it and dread to make any change. I think, however, that changing or neglecting to change in such matters from established customs must make a great difference in the profits of farming.

I would not imply that it is good policy for a farmer to sell much English hay; on the contrary it is undoubtedly the best plan to feed to stock kept on the place all the hay that is produced, and buy the grain in addition. Unfortunately, however, but few of us can do this; for we depend on the money received for hay to meet expenses.

Some few men, who can take city horses to board through the winter, combine the best points of both systems, obtaining the manure as a return for the care of the horses, and receiving about as much for boarding them as the hay consumed would bring in market.

A plan which I tried on a small scale the past winter gives me very good satisfaction, and furnishes a considerable amount of manure.

Finding in the fall that I should not be able to get horses to

board to eat my surplus hay, I bought, in December, a few farrow cows and fatted them, selling them, after feeding from two to three months, at an advance sufficient to pay for all the hay and meal consumed.

Some plan of this kind must, I think, be adopted by many of us to keep up the fertility of our soil. If we can devise some system that will enable us to feed to advantage more than we raise, we shall succeed in greatly increasing the value of our fields and pastures, of which we have ample assurance, in the results obtained by the farmers of England, who have increased the average yield of wheat twenty bushels per acre by this process during the last few years.

Another requisite for the attainment of success is a strong faith. A farmer of all men is most dependent on nature for his bread, and he should manifest in his life the belief that "seed time and harvest shall not fail." We often hear men expressing the opinion in some rainy time that the seed will rot in the ground; and again, when summer comes, that everything will dry up in the heat. Now we should be above all this, knowing from the experience of the past that an important crop is seldom cut off by any change of weather, and that any loss on one product is almost always made up on some other one.

And above this general faith in the operations of nature we should reverently trust Him "who giveth food to all flesh; for his mercy endureth forever."

There is yet a qualification to be mentioned, as important as any that has been named: which is, the need of more information on matters of public interest than is possessed by farmers as a class.

Of course the men now on the stage of active life are not to be wondered at for this deficiency, as in their young days the facilities for obtaining such information were not nearly so abundant as at present.

It is therefore to the *young* men, who, like myself, are just beginning their career, that I would speak. In these days, one must know something of events taking place beyond the limits of his own State, or country even, if he would take a position of importance in the community; and as we are so favored with good newspapers at cheap rates, there is no reason

why any one should fail to be well informed in regard to the progress of events throughout the world.

If want of time to read is urged, I say that there are spare minutes enough in every week, if we will only save them, to give a large amount of reading when taken in the aggregate.

We will now consider some of the more common objections to farming as an employment. They are:

1. The hard toil required.
2. The small amount of money obtained for the labor.
3. The deprivation of social advantages enjoyed by the residents of cities.
4. The small opportunity afforded for acquiring distinction in any public capacity.

The first objection is the hard labor required. We think this is obviated in a great degree by it being nearly all performed in the open air, as it is generally admitted that one can perform a greater amount of work without injury, whether it be mental or manual, if he lives mostly out-doors.

The facts sustain this idea, for while we continually hear of men in all other pursuits having to give up business on account of failing health, it is almost never that we hear of a farmer suffering from such a cause. Then, what other business is there where, taking six days in the week, and fifty-two weeks in the year, the labor is not more arduous and less satisfactory than in farming?

I know that young farmers, as they work in the field, sometimes look with envy on the shoemakers, who finish their day's work in the middle of the afternoon, and spend the remainder of the day in base-ball or other sport. But if they watch these same shoemakers through the year, they will see that there is commonly a period of enforced idleness in the winter, that must do much to absorb the abundant and easily-earned wages of the summer; then, if it were not for the name of sport, the ball-playing would be harder than haying.

The second point is, the small amount of money obtained for the labor. To this the reply is, that money is valuable only for what it will procure, and as I have stated that it is generally admitted that enough can be procured to secure a good living, I shall now show some things for which the residents of

cities pay large sums of money, which the farmer has without money and without price.

Almost every one enjoys looking at a fine picture, and in the homes of the wealthy pictures are regarded as absolutely essential to the furnishing of the house, and for them large sums are often paid, the masterpieces of our best artists frequently bringing more than would be needful to stock a farm.

So, in view of the pleasure to be gained from these and other works of art, it is said one should choose an occupation that will give him the means to gratify his taste; but one whose life is passed among the constantly changing aspects of nature needs no *picture* to enable him to comprehend that a sunrise is beautiful. It does not require the skill of an artist to reveal to his eye the loveliness of the quiet valley among the hills, or the broad panorama which he can view from so many of the hill-tops of old Essex.

And if one has a taste for animals, it is much more satisfactory to own the sturdy oxen, the quiet cow, or the fine horse, than to be able to buy one of Landseer's paintings of them; for the most that he or Rosa Bonheur can do is to paint to look like life. And what need has one, who can possess the originals, of the copies from life of even the most distinguished artists? So to every person who has a love for the beautiful, without the means to surround himself with pictures, I say, become a farmer, and then "lift up your eyes to the hills," or, better yet, *live* on one and be satisfied.

We will now consider the third point, which is the deprivation of social advantages enjoyed by the residents of cities. If you were to ask what advantages farmers lose, the reply would most likely be, lectures. Now, how about the lectures? The common opinion among well-informed men is, that as a means of education they are valueless, if of the kind known as popular lectures; and if scientific, they are interesting only to a limited number, and whatever advantages they afford in a social way can be obtained by other methods.

In regard to concerts and other gatherings, while they afford much enjoyment, we think we are compensated in other ways. Said a minister to me once, when speaking on this subject, "You farmers have a chance to *think*, that those who live in cities fail to obtain."

In the present condition of society, and with the abundance of newspapers, there is no reason why the young farmer cannot be as well informed in regard to all matters of public interest as the young man in the city; and if the former will spend his leisure in acquiring useful information from books, he will be probably the more intelligent of the two.

Fourth. The small opportunity for gaining distinction in any public capacity. It may be questioned whether this distinction is as enjoyable in possession as in anticipation, for we know "uneasy lies the head that wears the crown"; but if one has the ability to rise in public life, there certainly is nothing in farming as a pursuit to hold him back.

The history of this nation abounds in illustrations of this truth. From Washington down the line of presidents, and among the statesmen of the country, too, we find eminent names distinguished both for success in public life and for interest in agriculture. Webster's biography gives an account of the interest which he took in his farm, and some of his letters mention his oxen in a way which shows he had a true farmer's regard for his team. So, then, let us be good farmers, and if needed in any other place, have no fear but that we shall be called, "not to go up higher" (for we claim that an intelligent farmer is on a level with men in any other position), but to take a position of larger opportunity and wider fame.

At the present time, when so many young men are going West to settle, there is no doubt a temptation to many of us to follow their steps, and abandon these rocky hills for the fertile prairies of the distant States; but any who are inclined to go should ponder well before forsaking the old farm, for in looking at any new position, we are more apt to see a few obvious advantages, than to gain a just conception of things as they really are.

The dangers which beset the growing crops of Western men from insect foes are much greater than in this region, and the hardships which men undergo in establishing themselves on new land are so severe that it may be questioned if the money made by some of them would counterbalance the privation which they endure to get it.

So, all things considered, if one has a farm here, he runs a

great risk in going West or South with the expectation of improving his condition. So to my brother farmers of Essex, I say, what though

> "The Southland boasts its teeming cane,
> The prairied West its heavy grain,
> While sunset's radiant gates unfold
> On rising marts and fields of gold,"

still let us remain in these hills; and as our fathers drew from them bread, and as from this State have gone forth those who have in all the walks of life honored their birthplace, let us maintain a sturdy independence, endeavoring to make our farms better than when we took them,—to make ourselves better farmers and wiser men than any generation that has gone before, and so uniting in ourselves qualities which distinguished Lowell's hero, in his poem of "The Courtin'," than whom

> "None couldn't quicker pitch a ton,
> Nor draw a furrow straighter,"

with those which Whittier has embodied in his young farmer, in "Among the Hills," of whom at an interesting period of his life he says,—

> "Framed in its damp, dark locks, his face
> Had nothing mean nor common;
> Strong, manly, true, the tenderness
> And pride beloved of woman.
>
> "He has his own free, bookless lore,
> The lesson nature taught him;
> The wisdom which the woods, and hills,
> And toiling men, have brought him."

Let us produce in real life the ideals of the poets, and so hold an honorable position in the community, discharging all the duties that come to our lot with the faithfulness with which nature rewards our labor. And thus our beloved county shall be as widely known in the future, as she has been in the past, for the valor and enterprise of her sons, chief among whom shall stand the tillers of the soil, for we may ever remember

> "Honor waits o'er all the earth,
> Through endless generations,
> The art that calls the harvest forth,
> And feeds expectant nations."

THE UTILITY OF BIRDS TO AGRICULTURE.

ESSEX.

An Essay, by FRANK H. PALMER, of Boxford.

Better and more intimate acquaintance with the habits of birds, animals and plants which are to be found in the vicinity of the farm, is the only way to appreciate the assistance nature is willing to render to the farmer; and the more educated and intelligent farmers become as a class, the more will they study the principles of growth and reproduction in the natural world.

It is a universal principle in the whole realm of nature that animals and plants live by the destruction of other animals or plants. So life is transmuted into higher life, and a chain of existence is formed, one link of which being broken, disastrous results are sure to follow.

Now nature, if left to herself, establishes this wholesome equilibrium between the feathered and insect tribes, viz.: she produces no more insects than can be kept in check by the birds. But man, by his artificial habits, disturbs the proper balance between these tribes. By cutting down the woods, by disturbing the quiet of the forest by the sharp report of the gun, he destroys or drives away the birds, and thereby stimulates the production of insects, which become almost the greatest pests of the agricultural interests of the country. The extent of the evil caused by the infringement of these natural laws is easily demonstrated, first by reference to the undoubted facts of past experience, and secondly by showing what must surely follow the destruction of birds. It is estimated that at least 5,000,000 bushels of wheat are yearly destroyed by insects in the United States. One hundred thousand rose trees were lost by one florist in France, being destroyed by insects. Wilson says: "Would it be believed that an insect no larger than a grain of rice should silently and in one season destroy some

thousand acres of pine trees, many of them from two to three feet in diameter and a hundred to a hundred and fifty feet high." And many other like instances of the destructiveness of insects might be mentioned ; but we pass to the consideration of what must follow the destruction of birds.

The reproductive energy of insects is truly wonderful. It is said that a single pair of grain weevils have produced 6,000 young between April and August. The common varieties of aphides, or plant-lice, which are found on almost every kind of plant, are produced first from eggs laid the season before, and then through the summer only females are developed. At the last of the season males and females both appear, and eggs are laid for the brood that hatches early in the spring. Reaumer says that one individual in one season may become the progenitor of six thousand millions. The silk-worm moth produces about 500 eggs ; the great goat-moth, about 1,000 ; the tiger moth, 1,600 ; the female wasp, at least 30,000. There is a species of white ants, one of which deposits not less than 60 eggs per minute, giving 3,600 per hour. Such, then, is the enormous fertility of insects, and some of them breed several times a year, while most insectivorous birds breed but once a year, and then produce but four or five young. But nature has given to birds an appetite and an instinct which teaches them exactly when and how to go to work to capture and destroy insects and their eggs ; and if the number of eggs produced by insects is wonderful, so the number destroyed by a single bird is marvellous. Bradley says that a pair of sparrows will destroy 3,360 caterpillars in a single week. A young martin on a church spire, opposite our window, was visited five times in as many minutes by the parent bird, each time with an insect. A brood of partridges will nearly exterminate the denizens of an ant-hill in a single day. Woodpeckers are incessantly employed in ridding the orchards of insects and their eggs, which they skilfully discover under the pieces of dead bark. Robins, throughout the spring and summer, are continually digging for worms and grubs, which they find concealed beneath the surface of the ground. A day or two since we noticed a common chipping-sparrow capture a moth, and, upon depriving her of it, we found it to be that of the common apple-tree caterpillar (Clisiocampa Americana), so destructive to the orchards of New

England. It is easy to see then, how, when birds, the natural enemies of insects, are destroyed and driven away, it will follow that insects will increase, and an increase of insects is synonymous with a decrease of crops.

But there are to day many farmers in New England who do not believe that birds are beneficial. They occasionally lose a little corn by the crows, or a chicken by the hawks, and they judge the whole class of birds by a few such unfair samples. They drive the robins from the garden thinking they are pulling up the seed, and they take every opportunity to drive from the orchard the "sap-suckers," as they call the woodpeckers, thinking they are sucking the sap of the trees.

To correct such mistakes,—to induce farmers to study more the habits of birds, and to enable them more readily to distinguish the beneficial and injurious species, we shall give a brief description of some of the commonest birds of Essex County.

ACCIPITER COOPERII—*Cassin.*

COOPER'S HAWK.—This hawk is a common summer inhabitant of Massachusetts, being the smallest of those hawks known to the farmer by the significant name of "Hen Hawks." The nest is usually formed in the deep woods, almost always in a pine tree, in a fork near the top. It is constructed of large sticks and twigs, and lined with leaves of different trees; eggs, from two to four; color, a dirty white, with spots of brown and lilac, in some specimens distinct, in others the spots are very obscure. The breeding season in Massachusetts is about the 15th of May, but varies as the season is particularly late or early. This species is very injurious, as also the two following, partly on account of the havoc they make in the poultry-yard, but especially because they destroy a large number of small birds, which, if permitted to live, would do a great deal of good.

ACCIPITER FUSCUS—*Bonaparte.*

SHARP-SHINNED HAWK.—This species makes its appearance about the 1st of May, and throughout the whole season is engaged in destroying small birds, which form a large part of its food, although it occasionally captures a field-mouse of some sort. Audubon describes the peculiar flight of this bird as fol-

lows:—"While searching for prey, the Sharp shinned Hawk passes over the country, now at a moderate height, now close over the head, in so swift a manner that, although your eye has marked it, you feel surprised that the very next moment it has dashed off, and is far away. The kind of vacillation or wavering with which it moves through the air appears perfectly adapted to its wants. It advances with sudden dashes, as if impetuosity of movement were essential to its nature, and pounces upon and strikes such objects as best suit its appetite, but so suddenly, that it seems hopeless for any of them to try to escape." The nest is usually placed in a pine, about twenty feet from the ground, and is constructed of sticks and lined with small twigs and leaves. Eggs usually four, of a bluish-white color spotted at larger end with brown. They are usually laid by the last week in May.

BUTEO BOREALIS—*Bonaparte.*

RED-TAILED HAWK.—Mr. Samuels, in "Birds of New England," says:—"Every one has noticed this hawk up in the air at a considerable height soaring in extended circles, and uttering the oft-repeated cry, 'kae, kae, kae,' as he examines the earth beneath him for prey." I found a nest of this hawk in Boxford, Mass., on the 7th of May. It was situated in the topmost fork of a tall pine-tree, being about twenty-five feet from the ground. It was a very large affair, constructed of coarse twigs and sticks, many of them as large as my finger. It was slightly lined with a few pine-needles and leaves of other trees. In the nest was only one egg, though the number generally laid is three. The egg was just hatching, the young hawk having broken the shell so as to protrude his beak. It must therefore have been laid by the 20th of April. This hawk is very destructive to small birds and to poultry.

CIRCUS CYANEUS—*Boie.*

MARSH HAWK, MOUSE HAWK.—This hawk is often seen in the orchards and fields, but especially in the meadows and marshes, where it captures a vast number of mice and moles, which constitute the chief part of its diet. As it destroys but few small birds, and never attacks poultry, it is regarded with considerable favor by the farmer. It is easily distinguished from other

hawks, its habits being very different. It rarely utters a cry like the other hawks, but silently skims over the meadows in search of its prey. The nest is built upon a knoll in a meadow, and is formed of dry grass woven together, and slightly hollowed and lined with soft grasses. Eggs four in number, dirty-white in color, generally laid by first week of May.

PICUS PUBESCENS—*Linnæus.*

DOWNY WOODPECKER.—This woodpecker is the smallest we have, and is well known among farmers as a valuable agent in destroying the larvæ of insects which infest the orchard. At all seasons of the year, but more particularly during September and October, it may be observed busily at work destroying the eggs deposited on the apple-trees by the "countless swarm of summer insects." This bird excavates a hole about twelve or fifteen inches deep, in a decayed stump or limb of a tree, in which the eggs are placed on a few soft chips left in making the hole. They are five in number, of a beautiful creamy-white color; they are usually laid by the 10th of May.

COLAPTES AURATUS—*Swainson.*

GOLDEN-WINGED WOODPECKER.—This is the most common of all our woodpeckers, and any description of its habits seems almost superfluous. Both birds assist in excavating the hole which is to receive the eggs. This is often from fifteen to twenty inches deep. No nest is built, but on the bottom of the hole the female lays eight pure-white eggs, which are about as large at one end as the other. If the eggs be taken from her, leaving one for a "nest-egg," she will continue to lay more. An instance came to my knowledge where twenty-four eggs were laid in this manner before the bird could be induced to leave the hole which had been excavated with so much trouble. This bird is very beneficial to the farmer, as its food consists almost entirely of insects destructive to vegetation.

TROCHILUS COLUBRIS—*Linnæus.*

RUBY-THROATED HUMMING-BIRD.—How often do we see this beautiful little visitor in the flower-garden, at one instant pausing and thrusting its tiny bill into some flower, and then flashing out of sight like a meteor, and as suddenly reappearing! This

bird is commonly supposed to suck the honey from the flowers when it thrusts its bill into them; but this is a mistake, since it is insectivorous, and is searching after insects, not honey. About the 1st of June the humming-bird begins to build. The nest is built of soft down taken from the stems of some of the different ferns. Eggs two in number, white in color, elliptical in shape. Period of incubation, fifteen days.

CHÆTURA PELASGIA—*Linnæus.*

CHIMNEY SWALLOW.—Perhaps no other birds are so largely beneficial in their habits as the chimney swallow, for in every city, town or village there are thousands of them throughout the summer engaged day and night in destroying insects. Afar up in the sky you can see them as well as low down close to the earth, and in mid-air just above the trees, everywhere, busily engaged in catching their insect food. About the 10th of May they commence building. The nest is placed in an unused flue of a chimney, and is built of mud and sticks glued firmly together and to the chimney with the saliva of the bird. This forms a firm structure, in which four or five eggs of a pure-white color are laid.

ANTROSTOMUS VOCIFERUS—*Bonaparte.*

WHIP-POOR-WILL.—This bird is well known from its peculiar song, which is heard through the first half of the night during the mating and part of the breeding season. It arrives from the South about the second week in May. In its habits it resembles the following species, and is very beneficial, as its food consists principally of the night-flying insects. This bird builds its nest, or rather lays its eggs,—for it builds no real nest,—on the ground near a log, or where some brush or leaves have collected. The eggs are two in number, and very beautiful, being a delicate shade of white, with spots and blotches of brown and lilac all over alike.

CHORDEILES POPETUE—*Baird.*

NIGHT HAWK.—This bird is about as common in the city as the country, being most often seen at twilight flying about just over the tops of the buildings in the city, and over the treetops in the country, uttering his short note or "squeak," as Mr.

Samuels calls it. This species destroys great numbers of night insects. About the middle or last of May the night hawk commences the duties of incubation, laying two eggs on the bare ground, often on a rock, with no nest. They are a dirty-white color, marked with spots of brown.

TYRANNUS CAROLINENSIS—*Baird.*

KING-BIRD, BEE MARTIN.—This is a very common summer inhabitant of New England, there being a pair or two nesting on almost every farm. The nest is placed in a fork of a limb, generally of an apple-tree. It is composed externally of coarse moss and roots, and lined with fine roots and horse hair. Eggs are laid about the last of May; are a delicate white color, spotted all over with brown and lavender. To all but bee-keepers this bird is a firm friend, but it must be acknowledged that it destroys a large number of bees whenever it has an opportunity. But other winged insects are also destroyed, and therefore this bird is beneficial to the farmer.

SAYORNIS FUSCUS—*Baird.*

PEWEE, PHŒBE BIRD.—This well-known little bird arrives from the South very early in the season, often as early as the middle of March, when we see it perched on the picket of a fence before our window, or on a limb overhanging a stream of water, eagerly watching for the appearance of some insect; and now with a quick dart it secures its prey, and returns to its perch to break and eat it. This bird usually places its nest under a bridge, or in a shed or barn cellar. It is built of roots, grasses and moss plastered together with mud, and lined with soft grasses and wool and feathers. The eggs are four or five in number, of a beautiful pure-white color.

CONTOPUS VIRENS—*Cabanis.*

WOOD PEWEE.—This bird resembles the preceding in many respects, but is not nearly so well known, as it is only found in the deep woods. It builds a most beautiful nest upon a decayed limb. This is formed almost entirely of the different lichens, together with a few grasses and fine roots. Eggs are four in number, of a delicate cream color, spotted at greater end with blotches of dark brown.

EMPIDONAX MINIMUS—*Baird.*

LEAST FLYCATCHER.—This little bird is commonly found in the vicinity of the homestead, and often builds its nest in a tree close to the window, seeming to prefer the society of man to the solitude of the forest. It builds a beautiful little home for itself out of cotton, feathers, and bits of string, which it weaves together and fastens firmly in the crotch of some of the upper branches of the tree. The eggs are four in number, creamy-white in color. This bird, as its name implies, feeds upon flying insects.

TURDUS FUSCESCENS—*Stephens.*

WILSON'S THRUSH.—This bird makes its appearance about the first of May, and may be seen in the deep woods busily searching for its food, which, like that of all the thrushes, consists chiefly of insects. The nest is placed in a low shrub, sometimes on the ground. It is constructed of grass and leaves, deeply hollowed, and lined with hair and fine roots. Eggs four in number, and of a bluish-green color and oval in shape.

TURDUS MIGRATORIUS—*Linnæus.*

THE ROBIN.—Every one knows the robin, as it is a common visitor of every State, county and town in the country. Much has been said both in favor of and against this bird, but we do not hesitate to call it, on the whole, beneficial. It cannot be denied that it destroys many small fruits, but as these only last a month or two, and as during the rest of the year this bird is beneficial, it seems to deserve favor. The nest and eggs are so common as to need no description. The nest is found in a variety of situations, having been found in trees, bushes, stone walls, sheds, and on the ground. Two broods are reared in a season.

HARPORHYNCHUS RUFUS—*Cabanis.*

BROWN THRUSH.—Mr. Samuels says: "Probably none of our summer visitors are better known, and none are greater favorites, than this bird. Its beautiful song and well known beneficial habits have endeared it to the farmer, who takes it under his protection, as he should all the thrushes, and encourages its

appearance in the garden and orchard." This bird is known to all as the one we see perched on the top of some tall tree pouring out a medley of song, which consists of a variety of notes of other birds, and some original ones. The nest is built about the middle of May, either in a bush or on the ground. It consists of twigs, leaves and fibrous roots. Eggs three to five, dirty white, spotted thickly with brown and lilac.

GALEOSCOPTES CAROLINENSIS—*Cabanis.*

CATBIRD.—This is a common species, being most often seen, however, in low, swampy land, where it builds its nest on a bush or low tree. It is constructed of sticks and twigs, and lined with roots and hair. Eggs usually four in number, of a dark emerald-green color; they are laid about the first week in June. This bird takes its name from a plaintive note it utters resembling the mewing of a cat.

SIALIA SIALIS—*Haldemann.*

BLUEBIRD.—This beautiful bird is known and befriended by every farmer. It makes its appearance almost the first of the winged tribe, sometimes being seen before the snow has left the ground. Its beautiful song, heard when winter still seems with us, is welcomed by all. About the middle or last of April this bird commences building. The nest is placed in a hole in an apple-tree, or a fence post, or in a box prepared by some friendly hand—anywhere, in fact, where it can find warmth and protection from the cold winds. The nest is built of feathers, soft grasses and cotton. Eggs are four or five in number, of a very light blue color. The food of this bird consists of noxious insects.

PARUS ATRICAPILLUS—*Linnæus.*

CHICKADEE.—This busy little bird is known to all as a resident with us throughout the whole year, and at all times it is engaged in ridding the trees of their insect pests. It commences building about the second week in May. The nest is placed in a hole in a dead tree, and is built of moss, a few fine grasses and hair. Eggs are from six to ten, of a pure white color, spotted at the greater end with brown.

GEOTHLYPUS TRICHAS—*Cabanis.*

MARYLAND YELLOW-THROAT.—This bird is a common summer inhabitant of all the New England States. Its nest is usually placed on the ground, and is constructed of grasses and leaves, and lined with hair. The eggs are laid about the first of June. They are usually five in number, of a creamy-white color, and covered more or less thickly with reddish-brown spots. This species is most common in swampy districts. It is beneficial, as its food consists mostly of insects.

SETOPHAGA RUTICILLA—*Swainson.*

THE REDSTART.—This bird arrives from the South about the middle of May. It is a very beneficial species, destroying insects in the trees, and also flying insects. The nest is on a low limb of some small tree, and is constructed of strips of bark, grasses and weeds, all being glued together by the saliva of the bird. It is lined with soft cottony substances. Eggs four in number, white, with spots of brown.

FAMILY HIRUNDINIDÆ.

THE SWALLOWS.—The swallows are all beneficial in their habits, subsisting on insects, which they are continually catching for themselves and their young. There are four species common in Essex County, as follows: Cliff or Eave Swallow, Barn Swallow, White-bellied Swallow and Bank Swallow. These build their nests respectively on cliffs or eaves, in barns, in boxes put up for their accommodation, and in sand banks. The habits of this family of birds are so well known, that any description is superfluous. The Purple Martin also belongs to this family, but is not now very common in Essex County. Farmers would do well, however, to put up martin-boxes for its accommodation, and thus try to induce more of these birds to settle with us, as they are very beneficial.

AMPELIS CEDRORUM—*Baird.*

CEDAR-BIRD, CHERRY-BIRD.—To those who cultivate small fruits this bird is doubtless a considerable trouble, but to farmers in general it is as beneficial as almost any other bird. Nuttall says: "They fail not to assist in ridding the trees of the deadly enemies which infest them, and the small caterpillars, beetles

and various insects now [in spring] constitute their only food." The nest of this species is placed on a horizontal branch of a tree, and is built of roots, grasses, leaves and grape-vine bark. Eggs, four or five in number, are of a bluish-white color, and are marked with spots of black and brown.

VIREOSYLVIA OLIVACEA—*Bonaparte.*

THE RED-EYED VIREO.—This little bird is deservedly a great favorite. Its beautiful plaintive song may be heard at any hour of the day during the summer, as it searches through the elm and other trees for caterpillars and various other noxious insects. The nest of this bird is a wonder of ingenuity and beauty. It is constructed of pieces of wasp's nests, bits of paper, spiders' webs, and thin pieces of bark. These are woven together, and glued by the bird's saliva, in the form of a basket, and sewed firmly to the fork of some small branch of a tree. Eggs are four in number, pure white, with spots at larger end of brown and black.

SPIZELLA SOCIALIS—*Bonaparte.*

CHIPPING SPARROW.—This is a very common and well known bird, since it seems to take delight in associating with man, and is to be found nesting near his habitations. The nest includes a few fine grasses, but the chief substance used is horsehair. The eggs are four or five in number, bluish-green in color, and marked with spots of black and brown, thickest at the greater end. This bird is beneficial, subsisting largely on insects.

MELOSPIZA MELODIA—*Baird.*

SONG SPARROW.—This bird takes its name from its beautiful song, which is heard from early spring to the middle of October. Its habits are beneficial. The nest is placed sometimes on the ground, and sometimes on bushes or small trees, and is built of grasses and weeds. Eggs are four or five in number, and are of a dirty-white color, spotted with different shades of brown, thickest at greater end. Two broods are reared in a season.

PIPILO ERYTHROPHTHALMUS—*Vieillot.*

GROUND ROBIN, CHEWINK.—This bird has a peculiar note resembling the syllables "che-wink," hence its name. It is a

very common species in Essex County, and may be observed in the deep woods and by the roadside running nimbly along, or scratching among the leaves and dirt for its insect food. About the second week in May this bird commences building. The nest is placed on the ground, often beneath a tussock of grass. It is constructed of leaves and grasses, and is lined with fine grasses and roots. Eggs are four in number, of a dark reddish-white color, covered all over with fine spots of brown.

DOLICHONYX ORYZIVOROUS—*Swainson.*

BOBOLINK, REEDBIRD.—In the Southern States this bird is regarded with much dislike because it destroys a great deal of rice, but to New England farmers it is very beneficial, for while with us it subsists largely upon insects. Everybody has been delighted with the beautiful song of this bird. The nest is placed beneath a tussock of grass in some swampy tract of land, and is so well concealed as to be next to impossible to discover it. It is built of grasses and weeds. The eggs are four or five in number, and vary from light blue to grayish-white in color, with blotches and spots of black and brown.

MOLOTHRUS PECORIS—*Swainson.*

COW BLACKBIRD.—The habits of this bird are very peculiar. It makes its appearance about the middle of March, and, in flocks of perhaps ten or a dozen, frequents the fields where cattle are pastured, and feeds upon the flies and other insects which are to be found most plentifully about the cattle. When the female wishes to lay, instead of building a nest for herself, she visits the nest of some other bird, usually one smaller than herself, and, watching for an opportunity when the owner is away, she deposits her egg. This is generally hatched by the bird who has thus been imposed upon; and the young Cow Blackbird, being larger and stronger than the other young birds, often crowds them out of the nest and monopolizes all the nourishment and protection of the stepmother. The eggs of this species are grayish-white, with fine spots of brown over the whole surface.

AGELÆUS PHŒNICEUS—*Vieillot.*

SWAMP BLACKBIRD, RED-WINGED BLACKBIRD.—This bird arrives from the South about the middle or last of March, and

immediately establishes itself in the meadows and swamps. About the first of May the preparations for building commence. The nest is placed in a low bush and is built of coarse grasses woven together and deeply hollowed. The eggs, which are four or five in number, are of a light, blue color, and are marked with streaks and blotches of brown and black. This bird is rather injurious in its habits, as it eats a good deal of corn and other grain.

ICTERUS BALTIMORE—*Audubon.*

BALTIMORE ORIOLE, GOLDEN ROBIN.—This is, perhaps, the most beautiful bird in plumage and song we have. With the colors of gold and orange-red contrasted with the black on the wings, and with a voice of the purest harmony, it is deservedly a great favorite. The nest of this bird is a very curious affair. It is commenced by winding and weaving together a lot of string, thread ravellings, or anything else of the sort, and binding the whole firmly to the drooping branch of an elm or a willow tree. Thus a sort of pouch is formed five or six inches deep, in which the nest proper is placed. This consists principally of hair and a few fine grasses. The eggs are four or five in number and are of a bluish-white color, marked with irregular spots and blotches of dark brown and black.

CORVUS AMERICANUS—*Audubon.*

THE COMMON CROW.—No bird has ever excited so much controversy and comment as the Crow. At one time all the agricultural papers were continually saying something for or against this bird, and the question whether it is beneficial or injurious has not yet been settled to the satisfaction of all. In our opinion the Crow is very injurious, and we will give a few reasons for this opinion. It is well known to all farmers that the Crow does actually pull up and eat a good deal of corn. But those who defend this bird say that the insects he destroys compensate for this loss. Now, if we grant this the bird will be neutral, doing just as much good as he does harm. But this leaves unnoticed the fact, which is undoubted by all careful observers of birds, that the Crow destroys a great number of small birds which, if permitted to live, would destroy more insects in a day than a Crow would in a year. Therefore, we conclude his hab-

its are far from beneficial. The nest is placed generally in a pine-tree, near the top, and is constructed of coarse sticks and lined with leaves. The eggs are four in number, of a light-green color, covered with spots and blotches of brown. The eggs are generally laid by the first week in May.

CYANURUS CRISTATUS—*Swainson.*

BLUE JAY.—This bird is also of injurious habits, as it destroys but comparatively few insects, while during May and June it subsists on the eggs and young of other birds. The nest is placed on a low limb of pine or other tree, and is built of sticks and twigs, with hardly any lining. The eggs are four or five in number, of a light-green color, spotted finely with different shades of brown.

IMPROVING OUR SOCIETY.

ESSEX.

An Essay, by Francis H. Appleton, of West Peabody.

As this is a subject for which many county societies offer special premiums, as an essay, I have written the following, hoping it will be well received.

Many members of our society appear to be perfectly satisfied with the present system which governs the annual shows and the awarding of premiums; and, on the other hand, there are many members who wish to see the society continually making more improvement year by year. It could only be a selfish motive that would prevent the former from encouraging the wish of the latter; and where the object of any society should be to advance the welfare of the community, as is the case with this society, all selfish motives should be banished.

Again, it is fair to assume that all members of the society wish to see it as successful as possible in whatever it undertakes; and as we all know that *everything* is capable of improvement, we must admit that our society must come under this head. I speak in this way, because, as we must all know too well, there are some among us who obstinately close their ears to the voice of improvement, and who believe in "letting well enough alone," as they say. But should this motto ever be adopted, no advances would be made, and a state of stagnation would be the consequence, which could only result in decay and loss of influence. Our good old society is far from this state, but is capable of much improvement. All possible improvement cannot be made at once, but must be done step by step, and the longer the steps, the more shall be accomplished.

I am going to suggest some improvements that occur to me, and give my reasons for so doing, in the hope that they will be adopted, and that others will do likewise and suggest such im-

provements as occur to them. With live, but cautious, men to lead us, we cannot fail to advance the welfare of the community around us, which should be our object.

Why is it that the premiums are not awarded until late the second day of the show, after the annual dinner is finished, at which time a small number of those interested surround the secretary's chair to hear him read the long list? whereas, each one of the members would be better pleased to have had the premiums so awarded that the prize articles could be known and examined by those visiting the show and compared with other competing articles. The names of individuals to whom premiums were awarded for excellence in ploughing in its various classes, &c., must necessarily be made known at about the same time as at present.

According to the present system, the premiums are not awarded until the time arrives for taking the animals off the ground, whereby the people are unable to examine the prize animals, and thus profit by observing their points of excellence; and the owners of animals, who are desirous of getting their stock home early, are thus unable to examine the premium articles at the tent and halls of exhibition; and no one can find such articles without much inquiry, as no means are provided for designating them.

Would it not be a good plan to instruct the committees to fill out their books immediately after making their awards, on the afternoon of the first day of the show, and at that time to attach to every premium article, and each pen containing a prize animal, convenient printed cards to be furnished by the society, designating what awards each is entitled to? This year I entered two animals under a committee, and both received awards, but neither the secretary nor myself know which of them received the higher award; the committee made no specifications, although they fully understood the names of each animal. In examining the premium cards in the various classes, many worthy articles would be thus seen, which would otherwise be unnoticed by the visitors.

By this plan the secretary can be freed from the troublesome tameness of reading so long a list of awards. According to the present system, many competitors are often obliged to wait for the publication of the premium list in some county paper the

week following the show, before they can ascertain what awards they are entitled to. The premiums awarded for success at ploughing, drawing, &c., which are necessarily awarded the second day of the show, the secretary could continue to announce at the dinner; or they could be posted up in a conspicuous place at the show. This system would benefit all the visitors very much.

Many individuals who have served on committees of our society, myself among the number, having complained of the difficulty of finding the articles or animals entered for competition, on account of the incompleteness, illegible appearance, or sometimes entire want of any card attached to what has been entered under their committee, I would suggest in this connection, that when any entry is made to the secretary, a printed form, upon which shall be written the name of article and under what class entered, be given to the person making the entry, and which shall be attached to the article when placed on exhibition. These printed forms will both serve as a check for the entry, and be of very great value to the committees.

I have also some words to say in regard to those departments on the premium list in which I take most interest. I refer to the premiums offered for bulls, milch cows and heifers, and the appointment of the committees to award them; and shall speak particularly of the thoroughbreds, as the others seem to be well provided for.

Among the bulls, the Jerseys, Ayrshires, Shorthorns, Devons and other recognized breeds are all placed under one committee, and the same may be said of cows and heifers. It is specified that these "must have been owned by the exhibitor four months previous to the exhibition," and that "competitors are required to give pedigree, and committees are requested to be particular in this respect." These specifications are excellent, and should be followed to the letter with every thoroughbred animal, as no animal is thoroughbred without an authentic pedigree, but I fear this is too seldom done.

The type or points of an Ayrshire are different from those of the Jersey, Shorthorn and others. The thoroughbred Ayrshire is noted for a large yield of milk, and for the power of transmitting that quality to its descendants. The thoroughbred Jersey is noted for a smaller but very rich (butteraceous) yield,

and the power of transmitting it. The thoroughbred Shorthorn is noted for its capability of taking on fat, and there are some animals of this breed that are also good milkers.

Now let me ask my readers how *one* committee is capable of *justly* awarding premiums to these four, or more, entirely distinct breeds of cattle? Among thoroughbred milch cows it is not only necessary to ascertain which animal can give the most milk, but which is the best for breeding purposes.

Five men are now appointed upon most of the committees, and probably only three or four will be present; let us say four men serve on the committee, the chances are that three of the men respectively know the points of an Ayrshire, Jersey and Shorthorn tolerably well, while the fourth knows little or nothing about cattle, which is making the best of it we can. The committee, in examining the stock, come to the pens of Ayrshire bulls; they all examine the bulls, and then three of them look to the other man, who knows most about Ayrshires, and ask him what his opinion is, and, after hearing it, they are very apt to award the premiums according to his advice, or else they adopt their own opinions of what they know little or nothing, and award the premiums accordingly.

It is next to impossible for any county society to find *one* committee that will be capable of judging of all the various breeds of cattle that may be exhibited at a show. In the list of premiums issued by our society this trouble occurs in the bull, milch cow and heifer classes. To simplify matters, I would recommend that each committee on cattle consist of three members only.

No premiums are at present awarded to the following thoroughbreds:—Bullcalves, three-year-old heifers that have never been in milk, two-year-old heifers, yearling heifers and heifer calves. The milch cattle owned throughout the county consist chiefly of Ayrshires, Jerseys, Shorthorns, natives or grades, and specimens of a few other breeds, and I would suggest that the following system of awarding premiums to bulls, milch cows and heifers be adopted in place of that now in use:—

PREMIUM LIST TO BE AWARDED AT THE SHOW.

Ayrshires.—Bulls, two years old and upwards, 1st premium, diploma and $10; 2d do., $5. Bulls, under two years old, 1st

premium, $5; 2d do., $3. Milch cows, four years old and upwards, 1st premium, diploma and $10; 2d do., $5. Milch heifers, under four years old, 1st premium, diploma and $10; 2d do., $4. Heifers, one year old and upwards, that have never calved, 1st premium, $5; 2d do., $3. Heifer calves, under one year old, 1st premium, $4; 2d do., $2. *Committee:*—(Three members to be definitely appointed before the show.)

JERSEYS.—Same premiums as for Ayrshires. *Committee:*—(Three members to be definitely appointed before the show.)

SHORTHORNS.—Same premiums as for Ayrshires. *Committee:*—(Three members to be definitely appointed before the show.)

NATIVES, OR GRADES.—Milch cows, four years old and upwards, 1st premium, diploma and $10; 2d do., $5. Milch heifers, under four years old, 1st premium, diploma and $10; 2d do., $5. Heifers, one year old and upwards, that have never calved, 1st premium, $5; 2d do., $3. Heifer calves, under one year old, 1st premium, $4; 2d do., $2. *Committee:*—(Three members to be definitely appointed before the show.)

OTHER THOROUGHBRED STOCK.—Same classification to be used as with Ayrshires. Premiums to be awarded at the discretion of the committee. *Committee:*—(Three members to be definitely appointed before the show.)

MILCH COWS.—Best herd, of not less than five in number, to be exhibited at the Show; and a correct statement of manner of keeping and yield of milk for the six months preceding to be given, 1st premium, diploma and $15; 2d do., $10; 3d do., $8. Best milch cow, either thoroughbred, native or grade, with satisfactory evidence as to quantity and quality of milk and manner of feeding, 1st premium, diploma and $15; 2d do., $10; 3d do., $5. *Committee:*—(Three members to be definitely appointed before the show.)

NOTE.—All animals entered under the preceding classes must have been owned by the exhibitor four months previous to the exhibition. Competitors are required to give pedigree of all thoroughbred stock, and committees are required to be particular in this respect. A written statement will be required of the age and breed of the cows, and time they dropped their last calf, and

when they will next calve; the kind, quantity and quality of their food during the season, and the weight or measure of their milk, morning and evening, of each of the first ten days in June and last ten days in August. No awards are to be made to animals that are unworthy of them.

(I have submitted above "last ten days in August" for "first ten days in September," as it is at present, in order to keep the milk-record before the falling off in milk, caused by attending "New England," and other Fairs.)

When other thoroughbreds than Ayrshires, Jerseys and Shorthorns, that are worthy of being encouraged, are known to be in the county in sufficient numbers, I would recommend that separate premiums be offered for them. Such breeds may now be in the county unknown to me, and, if so, I would have separate premiums offered at once. Not knowing the exact yield, cost of keep, etc., of the Kerry cattle, and how numerous they are in the county, I cannot personally recommend them. It would be useless to appoint separate committees for each of the other thoroughbreds, which are very seldom, if ever, seen at our Shows at present, but I would have the society be liberal in any awards that will tend to extend the show, and elevate the standard of farming throughout the county.

The officials in charge of the cattle-pens at Ipswich this year did all they were advertised to do promptly; but somebody was at fault, in that, being obliged to stay in Ipswich the greater part of the night after the show waiting for the freight train, I was unable to get any hay for my cattle, except after no little trouble and difficulty in searching for some place where I could buy it. The society ought to provide for an emergency of this sort, as this fact might deter some people from exhibiting their animals, who otherwise would do so.

There are but few herds of thoroughbred animals of each of the various breeds in the county, and the owners of these animals are almost the only persons in the county who are capable of judging of the merits of their respective breeds. But if all the owners of the various breeds are to send representatives from their herds every year,—and we must all hope that the inducements will yearly be such that all will send animals,—the owners of these cattle cannot, of course, serve on the committees; and to have unprejudiced judges who fully understand what is required of them, we must ask intelligent breeders of thoroughbred cattle outside of the county to act as our judges.

No one can be a good judge of any breed of animals, unless he is well acquainted with a large number of herds throughout the country, and has carefully studied the characteristic points of both imported and home-bred animals of note. I really believe there are but few persons in this county, or this State even, who know what the pedigree of a thoroughbred animal should be, judging from my experience in examining the animals, and conversing with many farmers, at our largest fairs, both in this State and New York.

To be a thoroughbred of any breed, an animal must have an authentic pedigree showing that it has no blood in its veins except that which has come from animals raised in the country where such breed originated, or that which has come from animals having such authentic pedigree.

Any animal that has not such a pedigree is simply a Native or Grade, and should be entered as such; and unless this society enforces its present rule, which requires competitors to give pedigree, and requests committees to be particular in this respect, it is useless to offer such a long list of premiums for thoroughbred animals. As long as committees on thoroughbred cattle are appointed who know little or nothing about that of which they are to judge, I would advise all owners of thoroughbred stock to withhold their animals from entry for premiums, and not trust them in the hands of incompetent committees. If a good system cannot be otherwise brought about, this is the best and quickest way it can be done. But without resorting to such a radical method, it can be much better brought about by the trustees of the society giving the matter that consideration which it deserves, and remedying the fault at once.

With an ample premium list, and competent and unprejudiced judges, carefully appointed, we shall in this particular have all any one can wish, and if other much needed improvements are also carried out, a most excellent show must be the result. In a comparatively small community there are but very few persons who can be unprejudiced judges of another person's property, where such property is owned in small quantity throughout such community—as for example, thoroughbred cattle in Essex County; but where property is extensively owned in large quantities, there are many persons who are competent

and unprejudiced judges of such property—as forexample fruit in Essex County.

So much for the character of the committees that are to be appointed by our trustees; and if it is certain that the men who are appointed on these committees will serve, it will be well and good. But, unfortunately, according to the present system, there are many vacancies on the committees, which would not be the case if committees were carefully appointed.

Poultry is a branch of farming that is attracting much attention at present throughout this and neighboring States, and our county can boast of many fine birds, which are one of the chief features at our county shows. The rivalry in this class runs so high that all chance of prejudice influencing members of the committee should be strongly guarded against; and if necessary, what objection would there be to asking persons outside of the county to serve on committees, if capable and unprejudiced judges can only be obtained in this way? None; and, as I have already recommended in regard to some of the cattle, this would be an excellent plan.

I think it would be better to divide the poultry into two classes, and place each class under a separate committee. At our last show the poultry committee were nearly two days making out their list of awards on account of the large number of entries. This is too much time to ask any committee to give, and as the interest in poultry is on the increase, two separate committees should be appointed. Let the larger birds (Asiatic), and ducks, geese and turkeys, be in one class; and the smaller birds (non-sitters), which are more numerous than the larger varieties, be in the other; and this arrangement will simplify matters very much. It must also be borne in mind that new breeds are frequently coming into notice, and our premiums should be carefully revised every year accordingly.

I passed all my time, days and nights, at Ipswich during the last show, having both cattle, vegetables and butter from my own farm on exhibition, and being interested in the swine and poultry, so that the foregoing is written from my own personal experience, after two days of careful observation. There are other subjects connected with the advancement of our society which I shall hope to discuss at some future time, if others shall not have already done so to advantage.

ON THE MANAGEMENT OF AGRICULTURAL SOCIETIES.

MIDDLESEX SOUTH.

A Prize Essay, by JOSEPH N. STURTEVANT.

I propose to offer some suggestions on the management of agricultural societies. In doing so, I hope to have a hearing, not that I may say anything that others have not thought of, but because any thought any one has to offer, on so interesting a subject, ought to enlist attention. In treating this subject, I shall not offer any recommendation which is not suited to the present constitution of the society. I would not lay other foundations than what are familiar to all, whether the present foundations may be laid after a wiser plan, will not enter into the scope of this essay to determine.

There are at the present time in the State, thirty societies devoted to agriculture, each of which has the right of calling upon the treasury of the State each year, for a bounty of some hundreds of dollars, and of appointing a delegate to the State Board of Agriculture. With the exception of a single one, I believe they are organized in a similar manner, for the promotion of similar purposes, which we affect in our own society. So many societies having the like objects before them, and organized after essentially the same plan, occupying so important a place in the economy of the Commonwealth, is proof that the interest which they are engaged to promote is thought to be advanced by their existence. But whether the cause of agriculture, which amid discouragements, is still a chief interest among the industries of the State, is sufficiently promoted by these societies organized in its behalf, must depend wholly upon their management. If there is error here, it is possible for a society to prove an injury rather than a service to the community in which it is located; and I make the suggestion in this place, though not properly connected with the subject, that the State

Board of Agriculture would do a service to agriculture, were it to give this thought attention, and endeavor, where error exists, to discover it, and point out a remedy.

Agricultural societies are interesting when viewed from another stand-point. They appeal with considerable urgency to the farmer's good-will, because it is only here, with an exception or two in some districts, that we find farmers in association for the furtherance of their own interests. The principle of coöperation, as applicable to the farming community, received its first feeble impulse in the organization of agricultural clubs and societies. The preamble to the constitution of the Middlesex South Agricultural Society begins thus: "Impressed with the importance of associated effort, in carrying forward any enterprise having for its object the improvement of the community, we, the farmers, &c., organize." The agricultural society has become a familiar form of association with farmers; it has become a principal agency, through which the improvement of the community is sought by them, and as it stands alone, without the rivalry of other forms of association, it may be considered, for present purposes, as the principal means by which this improvement is to be attained. But it may be remarked, if this is the only place where we find coöperation among farmers, it is quite unlike that sort of coöperation known to several trades. It is less to promote the direct interest of the individual than of the class; it is less to advance the interest of a class than of the community. There is nothing in the effort at coöperation that injuriously affects the individual, and the strongest criticism that may be made on this attempt to do good in company with others is, that the adhesiveness of the units, if I may be allowed the expression, is too generally insufficient to give either force or dignity to the efforts of the society. To bring the units into a closer union, to direct the association to larger views, to give more precision to their efforts, and to define the scope of their duties and opportunities, will be the work of maturing years; and we may hope, as we become more familiar with the agricultural society form of association, some other manner of association, for purposes more directly affecting the farmer as an individual, may be devised, by which his remuneration may be in juster proportion to his efforts.

The number of agricultural societies may be taken as a meas-

ure of their need; and yet it is not altogether so. The need is greater than the measure would indicate, and in fact it is only as we consider the causes which have been working for generations to make great efforts now an essential part of the present agricultural situation, that we appreciate fully the agricultural problems of the day.

I hope to be pardoned for digressing here, for the purpose of offering some observations which may not seem to have a bearing upon the main subject, but which, nevertheless, may lend an earnestness to our views, as members of the Middlesex South Society, and thus make us more laborious in its behalf, and the cause. When people first began to pour into the New World from the Old, they found a virgin soil. Since the world began, nature in this quarter has been preparing the soil for the husbandman, had put into it all needful plant-food; and it was only needful for the European, when he came upon the scene, to cut away the trees, let in sunshine, plant and await the harvest, assured it would be abundant. But when the trees were cut away, the climate made drier, and the land given over to the plough, and annually a crop taken from the land equal, and more than equal, to the annual growth of forest, then the situation changed, and the land, instead of becoming richer with each annual growth, became poorer. Nature's method is to return to the soil an equivalent to what she takes from it. Each crop of leaves falling to the ground adds a layer of fertile loam, from which springs forth a new crop of leaves. But there is ever an increasing residue, so that the processes of growth and decay go on, and there is annual increase of depth and fertility of soil. The plant draws from the atmosphere much plant-food, and at its death lays it in the earth. Our husbandry has been of a different sort; it has been a defiance of inflexible natural laws; we have been thieves, so to speak, in the Lord's vineyard, until we have prospered, so as to have greatly added to our population, enclosed all the land, and made farms everywhere. But having done this much, and feeling, perhaps, somewhat settled in our prosperity, we are startled to discover our lands becoming annually exhausted of the properties that plant-growths require, and that they must be farmed after a different manner, or the native born of New England must quit their farms for other labor, or seek farms in the virgin West.

It is no doubt the coming realizing sense of the deficiencies of our methods, and an increasing dissatisfaction with them, that is leading of late years, to awaking of thought, and that of a more thorough kind, upon agricultural matters, and the foundation, first, of agricultural societies, and then of farmers' colleges. Had the science with the practice of agriculture been better understood and pursued a century since, there would have been less of that urgency for agricultural education that we discover to-day in the writings of all patrons of husbandry. There would have been less of this urgency, for then we had stood less in need of it. The problem would not then be, either abandonment of New England soil to brush and wild growth, or sterility, or more knowledge and a wiser husbandry.

Not only the cultivation of more fertile lands west, and the competition of the produce of these lands—cheap land and cheap crop—forces the New England farmer, if he is to prosper, to adopt the very best means to any given end. It may be said our farming is becoming a sort of horticulture—a gardening of the land. Our husbandry is in a transition stage, and passing forward to the superior, shall we call it English, or garden farming; and in doing so, if we are not thoughtful, in the quiet pursuing of the old way, many will be left stranded, as it were, by the wayside, and will bemoan the hapless times. And when we no longer attempt the raising of crops that may be cheaper produced a thousand miles away, and laid down at our doors, there will then, as now, be need of the greatest energy and enlightenment in agricultural matters—since the profits of the shops will cause, then as now, farm labor to be high-priced and scarce.

Our agricultural societies, then, are the offspring of the agricultural situation. In their foundation, agricultural societies may be considered as protests against existing practices and methods. The Middlesex South Agricultural Society is no exception to the rule. The district over which it presides being older and the soil longer cultivated, and more exhausted than in some places, there is, perhaps, a stronger reason for the existence of the society than in some other districts. Not that our agriculture is wholly vicious, or is less reasonably conducted than elsewhere, but simply because our farmers have inherited a soil largely abstracted by past generations of cultivators of its

fertile principles and thus are in greater need of all the assistance that science or other helps can bestow.

OBJECT OF THE SOCIETY IN GENERAL.

It will be enough to assume that its principal aim will be, as it ought to be, the improving of agriculture ; of the practices of farmers, that they may be led to adopt that system of husbandry that will conduce most to their own prosperity and the good of the community. The society should exist to the end that no farmer shall pursue a sort of farming less profitable than his neighbor. While a single one of us is following out in practice ideas which are inconsistent with the best notions of husbandry, then is our community less wise and less rich than it ought to be. As the Roman emperor provides that every citizen shall be a trained soldier, so should our agricultural society and every patron of husbandry, every one who would raise our material prosperity to all the height that is attainable, so work as to encourage the using of every acre to the best purpose, and every farmer to embrace as reasonable views in his art as may be forced upon him.

To the degree that a society has sprung from the exigencies of the agricultural situation will largely depend the definition or direction of its work. Some may be considered as destructives of old time, erroneous notions ; others, again, feel it to be their mission to build anew, to seek the introduction of the most recent improvements in culture, in tools, in domestic animals and plants. But all societies will occupy to some extent both positions, though the one or the other will naturally take prominence.

If it so happen that the society shall be able to demonstrate that certain fields and soils are unfertile, and unworthy of the labor that is being spent upon them, then the society will do good service by making the facts patent. Labor wasted may be directed to new channels, where it will receive reward. If I can discover to a man who is throwing away his labor and ill using his energies, by clinging to land that has already given all its life's blood, so to speak, and has no longer anything to give, and induce him to quit the land and bestow his labor upon other land, or lead him into the shop, or ship, or trade, or anywhere where labor is useful and is requited, then do I useful

service. There are doubtless thousands of acres in the State, many in our district, that had better be planted to forest and left to itself, than to be cultivated or pastured. Neither the society nor individuals should seek to persuade men to cling to farms that beggar them. The society owes it to itself and to the Commonwealth, that it make the farmer more farmer, his every day better paying; and when it discovers a man in hopeless struggle with rocks and sterility, or other unpropitious circumstances, planted by fate, let it tell him frankly the truth, and bid him quit the unequal struggle. The society should exact of its orators and its essayists something more than praise of agriculture.

If the society may not do this; if it may not lead people away from the farm, as well as to it, then it must be regarded as a double tax upon the community. To-day all persons are taxed (a wholesome tax) that our society may receive yearly a sum of money from the State treasury. That it may deserve it, and that the bounty may be wisely continued, the society should seek to enlist only that amount of labor in farming and farming improvements, so called, which in the nature of things may be reasonably expected to be remunerative. In so far as the society seeks to cast a false glamour over farming operations, and in doing so entices labor from other and needful industries, does the society evil, and the State bounty becomes a just grievance to every one.

I think it proper for our society, composed of such men as it is, that it have higher ambition, and take position in advance of those of frontier settlements, so to speak, where the profits of agriculture, or trade, or whatever else, has left less money in the community than we enjoy. There is a suburban character to our farming that our society may properly take cognizance of. It is then desirable for it to do something for human culture, as it now does in encouraging plantations of forest trees, flowers, &c.

It is appropriate to consider by what means the society may secure money to pay its debts, to continue its career, and to do such useful service as is becoming an agricultural society. From establishing the right basis of procedure, from the society doing everything in the best manner, and by its very services to extract from the community appreciation and generosity, much

may be hoped. But I am not unmindful of the fact that the tone of popular sentiment seems to require something to be done, upon occasions, which all persons will not accept as pertaining to agriculture. "The agricultural horse trot" (a phrase invented by a humorist and largely circulated) has done something to bring societies into disfavor. The phrase itself has done injury in cases where the horse interest has not monopolized the society's energies. But why some encouragement may not be extended to trials of speed, and the breeding of more rapidly going horses, I am unable to understand. There is a demand for such, as legitimate as the demand for faster travel upon railways and steamboats. Familiar with the sensation of rapid motion, a motion which the application of steam to locomotion has taught us to delight in, to go along now in the old way is to seem to go slower than it did in the olden time. Our human life performs a more active circuit than formerly, and it requires of brutes, as well, a quicker pace. I am ready to admit that this effort to go faster, to *drive*, and to breed horses for this *driving* community, is attended with many demoralizing influences. A society cannot be too prudent in its management of this horse question; it must adopt every check to gambling,—to jockeying; it must retain as much respectability about it as possible. Large numbers of persons are interested in horses. Should the society refuse this interest countenance, some other will spring up to take the direction of it. It is, I submit, beyond the power of an agricultural society to check this interest, if deemed desirable, but it is within its power to keep control, and exert an influence for good over it. It is for the society to retain control over it for this reason, if for no other,—that it may afford the money for useful work in other directions.

But whatever the society may see fit to do, let it affirm that it will not allow public morals to be corrupted under its auspices. Some follies, in themselves not harmful, may be tolerated in the interest of revenue, but they are to be considered in the light of excrescences, which will drop way and be forgotten in the maturity of the society.

There are two channels of influence, two distinct but parallel ways, by the following of which, the both better than either, the society may seek to perform useful service. The one most

familiar to us, and most readily appreciated, is that suggested by the words, "Cattle Show and Fair." It is not required of me to picture the annual ingathering of farmers into an enclosure; the excitements of the horse trot; the quiet interest manifest in cattle; the pleasures of the hall, to those who like to walk in a garden; the dinner and half-heard speeches; or the pleasant social reunions and talks of the farm. It is the festive gathering of the year, the rural gala day, and it could not be done away with without almost universal regret. The tendency of the times is to add somewhat to the importance of the occasion, and to demand that it be made to impart to us more absolute instruction.

The central idea of an agricultural fair—aside from that social and moral—is that, by bringing to one place, occasionally, animals and articles of superior excellence, so that they may be conveniently seen and studied, every one may have opportunity of becoming acquainted with the appearance, at least, of whatever is best. The horse of the most just proportions, either for work or speed; the cow that does good work, either as milker or butter maker; the hog that appears the most economical animal, it is well to have brought within the enclosure to be seen of all men, and so of everything agricultural for which high excellence is claimed. Superior excellence is not a fruit which grows upon every tree. It matures only in favoring soils and under the careful guardianship of the wise.

I think it must be allowed that the only great object a society can propose to itself, in inviting those having choice animals, fruits, tools or anything, to bring them to the fair, is, that they may be conveniently seen by a large number of persons, and thus furnish to the mind, or aid the mind to form to itself, pictures or models of excellence. By furnishing to the farmer originals, or models of what is proved good, or generally accepted as good, of the class to which it belongs, he will soon come to be himself a judge in the matter; without thus seeing he could not hope to be.

I deem it of the utmost importance in agriculture, as in other things, that whatever one man has which is desirable to all men, or many, all should have opportunity to observe. The minor considerations I pass over.

To the position here laid down, the one great object of the

fair, I desire the reader to give careful consideration; accept or reject it. Upon the acceptance of the position here taken will hinge the appositeness of thoughts to follow. Anything which obstructs the service of the society to the community, in this particular, is an injury, and must be rejected, except in so far as need of funds, and perhaps popularity, may make some other line of action a temporary necessity. But such compromise is an injury, always, to the agricultural services of the society. It is a compromise, and as such is evidence of want of tone in the agricultural community. Let the Middlesex South Agricultural Society resolve,—

Whereas, The prime object of an Annual Cattle Show and Fair is for the purpose of bringing under the observation of our farmers, for their study, models or examples of excellence, in the several classes for which premiums are offered, and by which, the best being rendered familiar, all may hope to become better judges than they now are, and labor to have what is decided to be good and desirable become common; any action which directs attention from this object, as sensational programme, and anti-agricultural, is to be accepted as a temporary expedient, to promote the prosperity of this organization, and not as in the line of its obligations to the community.

So far as the good service of the society is concerned, it matters not whether the excellent come from within or without the district. If there is a better Shorthorn, or Jersey, or Ayrshire bull out of the district than in it, it is desirable to have the best in the society's enclosure. The best does the most service, since he affords the eye a better model for study than the inferior possibly can. If the premium is forty dollars for the best, and the money is drawn by a person residing outside of the district, the injury to the society, in any view we may regard it, cannot exceed forty dollars. The good cannot be estimated; and possibly the outside entry has brought more money to the gate-keeper than the sum of money carried off in premium. The society's services must not be measured by the bounties it strews among the farmers. This money service is incidental to higher service. I am sorry to remark that some few farmers seem to take a different view of this matter.

This circumstance brings in a clearer light the advantage, when practicable, of awarding, in lieu of money premiums, medals, books and subscriptions to useful papers or magazines. When it is given in the form of reading matter, the society has the satisfaction of observing that it is doing double service. The object sought in awarding the premium is as well attained, and the influence of the society is extended into households and circles which it may not reach in any other manner. The gift is as much a gift as though given in money, and perhaps is generally more pleasing. Medals, too, have an influence, beyond the immediate occasion that brought them. It was with much pleasure I observed, among Scotch farmers, the pride taken in the possession of medals, secured by them at fairs, and the tenacity with which they clung to them. Some had secured enough to have quite a little fortune were they coined into money. To them they had a higher value than the silver contained in them.

The best animals in the park, if properly entered, and worthy of it, should be allowed the first premium always. It is a pitiable error, when, by a ruling of the society, of several animals, it is rendered possible, nay probable, for the poorer to carry the premium over the superior. How does the rule stated (I believe) in these words work? "No animal may receive the the same premium twice." An animal having been judged best one year, its owner having no encouragement to bring him into the park again, he remains at home. The animal taking the second prize, in 1869, takes the first the year following. In 1870, two of the best animals in the region, perhaps, are at home, and this year the animal which stood lately third in rank carries off the honors. Thus, in a few years, the first, second, third prize animals, have in their turn the first premium. I am aware there is a chance of new animals competing; but this does not materially affect the operation of the rule. What value has such a premium? Think of a society encouraging itself that it is doing well, while it does not year after year encourage the bringing from the farms the best.

People enter the park with the expectation of finding there the choicest animals the region affords. The stranger makes inquiry and receives answer: "My friend, you were right in thinking that we have some better animals than you see here,

but those have mostly taken prizes here, all the society allows, and they no longer come. If you would see them, go to the farms. Every year sifts out the stock, the superior pass through and take prizes, and were it not for the patriotism, if I may call it, of individuals who send their stock, year after year, the show must soon become insignificant. There appears to be a sentiment that the pretty equal distribution of the society's surplus funds is desirable; that if the same individual draws money twice, although in different years, upon the same thing, there is ground for complaint. It does not occur to them that the premium is for services rendered, and that the public has more interest in its being rightly awarded than the individual. In my view a premium is offered to secure the exhibition of stock, and it is on the part of the society a mere saying, that of stock exhibited, so and so has the best, and in saying so, if it say truly, the public is greatly served. I suppose your society is managed quite differently?" "No; it is quite the same. Some of us have thought to change the matter, but it has been objected that if the society were not to encourage the entering of the inferior animals, almost as much as the better sort, our pens would be only half occupied, and people come to take little interest in the show. As it now is, every one expects something. When it is suggested that it is better to show a few animals that are good, over a poor lot, but many, it is difficult to get attention. But, however, last year the orator of the day remarked, luckily, that the best animals upon the ground, he observed, the judges passed over as of no account. 'But I suppose,' continued the orator, 'the judges know a cow from a mule, and these must have been improperly entered.' Upon this, one of the judges who was present, popped upon his feet, and not hearing all that was said, took offence, and after saying much beside the point, it came out that the best, three years ago (somebody remembered the date), were the best now, 'but it would be a bad affair, just because Hoofman has these brutes and money enough to keep them on timothy and corn, he is to shut us farmers out from getting anything.' Well, there was lively times for a few minutes, you may depend. The orator, after the uproar had somewhat subsided, said he would now take the occasion to discuss the aims proper to an agricultural society. He ventilated the matter consider-

ably, and I think did some good. He said, among other things, 'that a poor bull, receiving the first prize one year, it deceived some persons, and he got considerable stock; that stock was poor, and much loss was occasioned. A very good bull absent from the park several years had been overlooked.'

"The person to whom this was addressed, said he must now be excused, but first allow me to ask if it is customary with you for the orator to discuss such matters as these? For our part we expect him to read an address, and if he says nothing of agriculture or touches it slightly, all are satisfied. The orator is expected to visit different departments of the fair, and to found his remarks upon whatever the occasion may call to his mind. Sometimes it is one thing, sometimes another. Last year our orator came from a cheese district; he observed that our cheeses were wanting in flavor, and in fact were poor. So when people gathered in the hall he discoursed upon cheese making, and being familiar with the subject, he made a most excellent impression. There were questions and answers." After this being said, the person addressed said "he must now be going, but hoped the subject might be continued at a future time, as it was of great interest."

Some societies require exhibitors to make entry of their articles some days in advance of the fair. By this course the officers have opportunity to prepare suitable accommodations for everything, to guarantee satisfaction to every one, and it saves the cost to the society of making preparations for a larger exhibition than is justified by the result. The society also have opportunity of making mention in the local press, or otherwise advertising, any entry that may be of a character to particularly interest the public, and thus confer a favor upon both public and exhibitor, and materially increase their receipts. With some societies it is a practice to exact the deposit of a sum of money with the secretary, from the would-be exhibitor, the same to be refunded when the object is brought into the enclosure. It works as a guarantee that the promise will be fulfilled, and in the event of failure, the funds of the society are swelled to the extent of the deposit. It works well, in our society, with the ploughing match and with track horses. I merely offer the remark that the system admits of considerable extension.

The value of a premium will, in the long run, depend upon the freedom of the society from fettering rules, and the competency of the judges. Our prizes may come to have a value above those given by any local, or indeed present society in this vicinity, because they may come to express the honest opinion of not only fair men, but of better judges. When a committee award a premium it should be given with a statement of the entries, so that the public may estimate its true value. Often it would be well for the judges to state the reasons upon which their verdict is based; this will offer no difficulty to a competent committee. Where there is no competition, it might be desirable to withhold the premium, but in its place give a gratuity of equal value.

The appointment of suitable committees is an important matter. Upon their character will not only depend the worth of the awards, but the reputation of the society at home and abroad. When it occurs that neighbors are the appointed judges of each other's stock, or what is worse, and happens not infrequently, persons in interest, be they ever so honest, suspicion of partiality will attach to their awards. It occurs thus in our society: Mr. A. judges Mr. B.'s Shorthorns, Mr. B. judges Mr. A.'s Jerseys. The selection of judges being a matter of some importance, and requiring no little deliberation, the present system of the trustees of the society meeting in a body to do this is objectionable.

1st. The body is quite too numerous to deliberate well.

2d. The time which they allow themselves to attend to the business, which includes the selection of committees, the arranging of the programme of exhibition, and other details, is so short, as to necessarily hasten their labors. I would suggest that these two obstacles to the trustees' doing their work in the most perfect manner, may be overcome by their appointing a committee from among themselves, to meet with the executive officers, to determine with them the committees.

I think the judges should be appointed from outside the society's incorporated limits, if good men can be secured, by the society defraying their expenses of travel and entertainment. To do so will be an inroad upon the custom of the society distributing its honors and duties among influential members. They may get along very comfortably without the honors; it is

not useful that this state of things continue. It is very probable, should the society secure able men from abroad, eminent for their judgment in those things appointed them to judge, a few years would find the entries pressing in upon the secretary as never before, and the society come to rank as among the most influential in New England. But yet more is required.

My idea would be for the society in no case to foster a taste for that which is unprofitable or undesirable, and bestow the largest encouragement upon those useful objects in which the most capital is invested in the district, unless in cases where the society desires to encourage the trial of something new, or other special purpose. I am speaking of the society now in its field work,—work upon exhibition days.

The amount of premium will not always determine the amount of inducement to exhibitors. If it costs more to exhibit some kinds of live stock than others, as it undoubtedly does, then the relative encouragement given for the exhibition of different kinds of stock, or articles, in as far as money is concerned, consists in the relative margin for profit above the cost of exhibition, should the premium be secured. Thus it will cost more to bring live stock from a distance to the fair grounds and maintain them, than it will to bring a plough or tedder. In fixing premiums it will be well to consider the cost of exhibition, and to fix them enough above this sum to afford some profit to the exhibitor, if he is so fortunate as to secure a prize. When there is first, second, third premium, I would have the lowest, if practicable, higher than the actual cost of exhibition. If the society had the means, it would be well for it, when many entries were desired, to pay to all exhibitors some portion of the expense they incur.

But it may be said, if the sum received above the expense of exhibition is that, which, so far as money is concerned, induces persons to enter animals and objects for exhibition, there will be many cases where this profit in premium, or chance of profit, will exist only for those who live near the fair grounds. Persons living in the remoter portions of the district are at greater risk, expense and inconvenience when they exhibit. If such receive premium it will not sufficiently recompense them. To secure considerable entries from the more remote towns, it is

necessary to secure inducement equal to that which is secured to the Framingham exhibitor.

An examination of the disbursements of the society to the people of the several towns in the district will show the unequal assistance rendered. It cannot be supposed that the figures of the secretary afford any criterion of the relative ability of the several towns to compete. Were all the towns to take the same interest in the affairs of the society as does Framingham, then our society must occupy a place of great prominence in the public mind. But the towns at a distance from the park feel the incubus of a long road, and to them, small premium. Exhibitors of stock know well that it is at considerable cost to the animal economy to take animals, some more than others, from barn or pasture, and subject them to the gaze of hundreds of persons, strangers to them, and irregularity of care and diet. To equalize matters to all exhibitors, whether of Framingham or the most remote town, and afford all practicable inducement to compete, let the premium list be arranged upon the basis of a sliding scale. To those who carry off honors, an addition may be made to the sum of premium, for each three miles the exhibitor resides from the park. If properly computed, every one will have chance for the same reward. When the premium is not money, money may be added to equalize.

I do not propose to consider the advantages that may accrue to the exhibitor, aside from considerations of premium. It is one method of advertising. It is for the society to offer what inducements it can afford, and leave the incidental advantages of exhibition to individual discernment.

There should be special encouragement extended to those residing out of the district to exhibit articles at our fair. It will not seldom happen that what it thus brought to the park will bring as much to the society at the gate, as the showing of what is owned in the district. It is a special object that entices many persons to the fair; a single animal may be the inducement. If it were generally known that the horse Dexter was to be at the park another year, this would secure large attendance, not only of horsemen, but of persons not specially interested in horse culture. Whenever it is advertised that a thing highly excellent of its kind may be seen at a particular place and time, then, if the thing excites particular interest, or the interest of a

class, as poultry among poultry fanciers, it will induce attendance. It were well, then, that the officers have accorded to them considerable latitude of discretion to appropriate money, or adopt, from time to time, such a course as to secure the showing, each year, of something really excellent, that without encouragement would not be shown. To have a fair ordinary exhibition of stock, a considerable quantity, with no specimen of marked excellence, is less desirable than to have some variety and few, but in each department some one animal of great merit. Depend on it, this one animal people carry home in their memory, and it goes a great way in answering the question, "Well, were you paid in going to the fair?" There are those who praise a fair, as a success, if the pens are full and overflowing; such are the city reporters of city papers. The farmer of the higher class derives his satisfaction from tracing upon the wall of his mind the model of excellence, and desires only to place there the image of the best,—the rest are as nothing to him.

Farming is no longer considered a specialty when closely examined. It is a bunch of specialties; and no one person, unless his mind is an encyclopedia of rural knowledge, can be familiar with and equally interested in all departments of agriculture. One man is a judge of ploughing, one of fruit, one of cattle of some breeds, another of something different. A complete agricultural exhibition can only be had by enlisting the coöperation of these various minds. The horseman may care nothing for small fruits or the dairy, nor judges in these things, for horses. It will not be needful to multiply illustrations. To have a complete exhibition, to have all departments equally full and well illustrated at the fair, it will, I think, be necessary to lay the responsibility in each department with those persons who are particularly interested and instructed in the class of things which concern it. We must come to regard the fair in its parts before we look upon it as a whole. Give each part largely to the care of those who understand that part best. The same as the State has found it necessary to have boards of charities, of education, of health, etc., in order that work in these directions may be properly attended to, so does it become desirable to follow this example in the conduct of an agricultural society. To some it may seem like too fine subdivision of duties. Have

committees for cattle, for horses, for fruits and horticultural matters, bees, poultry, etc. Would not any one, a member of that committee for which his nature fits him, perceiving that the credit of the exhibition in his department depends upon his exertion, see to it that the show here is creditable? It would involve, of course, responsibility and labor. Of these we stand in need.

To bring matters down to particulars, I will suggest there be appointed three persons much interested in poultry (taking this interest as illustrative of the course to be pursued with other interests); place with them the responsibility of this department; assign them space for exhibition; a certain amount of money for preparing this space for the reception of poultry, and the amount to be given in premiums and gratuities; also to establish rules, etc. Whatever the committee may propose to do will be laid before the executive committee of the society for their approval, without which they may do nothing. It is presumed the society will accord the committee as large an independence as is consistent with the general purposes and aims of the organization. Judges are not to be appointed by this managing committee, since the members are likely to exhibit poultry of their own or have a personal interest in the awards. It is essential that no suspicion of partiality on the part of the appointing power shall exist, and if this is lodged in the executive officers of the society, united perhaps with a small committee of the trustees, it will elicit more personal and definite responsibility.

Through the aid of this managing committee, poultry fanciers will have the surest guarantee of satisfaction. The central idea, upon which the success of the plan will hinge, is to lodge responsibility and influence with poultry fanciers; and if there is failure, blame does not attach to the society at large and discourage and enfeeble its influence in other directions. It is plain to see that such a system, adopted by a society predominating over a large area, where lively interest is felt in it, would promote the success of the organization. In a society like our own, local, of few persons adapted to lead and command a following, it becomes more a question, but I cannot help thinking it worthy of the society's most mature consideration.

With a debt as large as ours, it becomes us to increase our expenses only with the greatest prudence, and not without ex-

pectancy of additional revenue. Change for the sake of change, in our schedule, is not desirable, and it is safer to err on the side of conservatism, where money is concerned, than to hasten innovation. While it cannot be doubtful that a few years of energy on the part of the society will lighten the burden of debt, and thus enable the subject of disbursements to be looked upon from a stand-point different from what is now allowable, and these years will bring with them changed and improved programme and premium schedule, I think it not appropriate to consider the changes at present, when their adoption is only wise at a future day. Then again, it is wiser to consider details from time to time, as occasion demands, than to take them all up at one sitting. It might be possible to dress out our society in so fine clothes and so quickly that we should feel estranged from it and lose our ease. But if each improvement suggested, when approved, is accepted singly and upon its own merits, we shall come to look quite as fine, and have none of the awkwardness of the half-grown boy who has donned for the first time a suit of spotless broadcloth. For these reasons, and some others, I hope to be excused from lengthening this essay by the annexing of a premium schedule. The best way of the society expending its funds, the details of dollars and cents, furnishes of itself a large enough topic for an essay, and if it is to be considered, it had better be considered separately.

The cattle show and fair has been, in general, the principal avenue by which agricultural societies have sought popularity, patronage, and to reach rural improvement. I wish to call attention to another, merely suggested heretofore, by which improvement may be sought as successfully, perhaps, and I believe more so, though in a quieter manner: it is by means of securing essays upon agricultural topics, to be written and to be disseminated in the community. Of course the extent of good which the society may do by this means is largely affected by choice of subjects and the worthiness with which they may be treated. The amount of encouragement extended in this direction must depend upon the state of the treasury. As this species of service will not put money into the treasury, it will appear more appropriate to a mature and rich society than one in a different position. But I think it may be affirmed that much substantial good may be done by essays, and that our

society is prosperous enough to wisely devote some portion of its income each year in this line of service. Farmers do not refuse to read,—all men read these days,—and what we read becomes our thought, and instructs only less than seeing. To read, and grasp, and analyze the thought of others, is analogous to grasping with the hand an object and holding it before our eyes. Reading and observing, both, are the presenting of objects or ideas to the mind. Both are instruments of culture, and only by our using both can our agriculture be perfected. Then the essayist may bring to a prominence ideas that are incapable of being brought to the mind through seeing. Many of the problems of agriculture may not be elucidated at the fair; they concern rotation of crops, manures, the influence of the seasons, effects of drainage, the how to do, and when. Indeed, one-half of what is to be learned in agriculture is learned necessarily from social instruction, from reading, and, it may be added, great thinking.

Then if we may consider a society as doing its greatest, we shall think of its serving in every particular the cause, and as we regard a man who can think as well as work, so we shall regard this society. It will be a harmonious, equal, in no wise a one-sided organization doing half a work.

It has been complained that our Transactions interested but a few persons, and the secretary has said that he found it difficult to dispose of the number of copies printed. The reason is obvious. They were of little worth. The Transactions have been little more than memoranda of exhibition day's work, and brief at that.

Allow the secretary to print a good prize essay or two, put into the annual prize pamphlet some good agricultural thought, as he always can, if no prize essays are obtained, by seeking it in the proper places. It is not necessary for the matter to be original, but it must be new to this community.

It is for the society, or more properly its officers, to designate topics for essays. In place of proposing two or three merely, I would have the list considerably extended, so that the essayist may have considerable choice of subjects. There wil be more chance of the society engaging able minds, and also securing an essay. It may be asked what shall be done, the society wishing to print two essays a year, should there be pre-

sented a good essay on each topic handed in? I would have premiums liberal; fifty dollars would not be too much; a half dozen subjects or more. The rule adopted may read as follows: —The person who shall write and present to the secretary before (date) the best essay upon any one of the topics proposed by the society, shall be entitled to the premium designated for that subject, and to have his essay printed in the Transactions of the society, provided, it shall not be accepted, if judged deficient in merit, and provided, also, that not more than two premiums shall be awarded in one year. Should more than two essays of sufficient merit, upon different topics, be presented any one year, the same may be held over by the secretary to another year, and be deemed as essays of that year.

I append a list of subjects that seem to me useful for prize essays:—

1. For an approved report or essay upon farm fences, giving details of cost, permanence and general efficacy. By fence shall be understood any means of enclosing ground.

2. For an approved report or essay upon the advantages to be expected from top-dressing land in grass, and the comparative advantage, if any, of this system above frequent re-seeding.

3. For an approved essay upon farm architecture. The writer is expected to bear in mind the exigencies of our agriculture and that his readers will be South Middlesex farmers.*

4. Coöperative farming or mutual help in production and sales.

5. On soiling and pasturing. This essay, it is expected, will embody the experience of some one with whom the subject is familiar.

6. On pastures and woodlands; would it be well to diminish our pasturage area to increase the area in forest?

Subjects fifth and sixth may be treated as one, if desired, or separately.

* The author's idea it is expected will be illustrated by suitable drawings. It is suggested here that any plan which shall not combine maximum of utility with minimum of cost cannot be approved.

FARMING IN HAMPSHIRE COUNTY.

First Prize Essay, by S. C. Thompson.

Should an intelligent, industrious and enterprising young farmer, with moderate capital, be content to carry on his business in Old Hampshire, or emigrate to some other locality?

For a young man just starting in life, the most important thing, perhaps, is the choice of a profession to enable him to know upon what he is to depend for his subsistence, and this having been done, the next thing of moment is, in what section of country he shall pursue this occupation. Take the first part of this proposition as settled, that he is to be a farmer, let us look at the second, viz.: Where should he select his farm, and what should be his surroundings? In the selection of a farm, one of the essential requisites is, of course, to have something to begin with, that is, to have land which is naturally fertile, and not have to begin at the lowest round of the ladder, and contend with a barren soil and an inclement climate. The soil which would generally be preferred, is a deep, friable, and at the same time, retentive loam, naturally underdrained.

The slope of the land may, or may not, be of so much account to him, though preferably a south-eastern, southern or south-western exposure would be selected. The farm should be suitably divided into tillage, pasture and woodland, and be so situated as to be easy of access in all parts, and not too far away from the buildings. The buildings are of vital importance to the farmer, and should be commodious, warm, well ventilated and conveniently arranged. They should be situated as nearly as possible in the centre of the portion from which crops are taken. The location of the buildings is, however, something which can be more easily changed than many other things about the farm. Even if a good location, with regard to soil, etc., is determined upon, there are other and not less important considerations, foremost among which are those relating to transportation.

Good facilities for transportation are among the necessities in farming; let a farm be ever so good, the owner ever so practical and well informed, but having no easy method of conveying his crops to a market, he can never hope to compete successfully with another, who, though not having quite as good a farm, has what more than compensates for this, namely, easy transportation. There should be something besides good highways, though these are most valuable adjuncts. Good railroads are of greater importance than good highways in most sections, as there can be but few places where a person is able to carry his farm produce directly into market himself. Having good markets near by will save much of the risk incident upon sending crops by car to a distance. A city market is of course superior to any smaller one, as the quantity which would cause a glut in the latter, would not make any appreciable difference in the former, and the prices fluctuate less in a large market. During a few years past there has been much said and written upon Western farming, the immense profits, light work, etc., but we will presently look at some facts in regard to this.

Yet there are, or should be, some other objects to be kept in view as well as dollars and cents. True it is that most of us are toiling and striving after "filthy lucre," though we try to delude ourselves with the belief that the goal for which we are laboring is something more noble; yet in farming perhaps more than in any other pursuit, there are other aims more important than pecuniary matters.

Of course such a thing as a bachelor farmer is not to be tolerated for a moment; although a bachelor may succeed in nearly everything else, yet in this particular branch, the need of a better half will make itself painfully apparent. To a farmer having a family to rear, there are many things which must claim as much of his attention as the laying up of money. If he is intelligent, he wishes of course to have his children as well or better educated than himself, and in order to do this, it is necessary to locate where he can reap the benefits of good schools.

You may say, if a man has money, he can educate his children away from home, if there are no suitable schools in his vicinity, but I think most will allow, that for young children, an education obtained away from home will not compare favor-

ably with the training received under the watchful and interested care of parents. Should a person go to the West to follow farming, he cannot expect such educational advantages as he would enjoy in New England, and especially in this State. In the South the case is still more strongly marked, for while good schools here are the rule, there they are the exception.

A lack of churches is another thing very keenly felt by a person going from the East to another section, and unless one is fortunate enough to obtain a farm near some city or town, he must deny himself the privilege, or contribute liberally to build up and maintain such a society as suits him. Still another disadvantage which is met by persons not living in a well populated region, is the want of society; it will be the more unpleasant from the fact that a farmer's habits and mode of life, tend to make him enjoy the company of others, and be of a free and hospitable disposition.

With regard to the animals on the farm, he should be so situated as to continually improve them by judicious breeding. It is hardly probable that a young man will have capital enough to permit him to buy thoroughbred stock, so he must locate where he can avail himself, as far as possible, of blooded stock. Now having enumerated some of the requirements of the farmer, let us see where the most of these can be satisfied. Let us begin in the same order as before, first with the soil. It is a recognized fact that there are few, if any, sections, where a person can get a soil adapted to such a variety of crops, as that of the Connecticut River Valley, and especially that part in Hampshire County. We hear of the large crops of the West, in grain, hay, tobacco, etc., but here we get a larger crop per acre, as we shall presently see.

Taking the figures as given by a recent writer on the subject, and comparing the common crops of both regions, we reach the following results. Beginning with corn: in the year 1867 the corn crop of Massachusetts, compared with that of Ohio and Texas, was 35 bushels for Massachusetts, and 28 bushels for Ohio and Texas. The value of an acre in Massachusetts was from $50 to $54, in Ohio, from $20 to $23, and Texas, from $17 to $22. For wheat, the average yield in Massachusetts was 16 bushels, Ohio, 15 bushels, Texas, 9 bushels; while the wheat of Massachusetts was worth $2.75 per bushel, or $44 per acre, that of

Ohio was about $2.40 per bushel, or from $27 to $30 per acre, and Texas, $1.90, or from $17 to $18 per acre.

These figures are for the grain alone, but while the corn stover is comparatively worthless in the West and South, here it is worth from $10 to $15 per acre, and for straw the difference is fully as great.

If you raise oats, the average crop of Massachusetts is 28 bushels, which is worth, one year with another, 75 cents per bushel; in Ohio, the crop is 30 bushels, and Texas 28 bushels, worth 40 cents per bushel, with the same difference in the value of straw as before given. The tobacco crop in Massachusetts is 1,100 pounds per acre, and the superiority of the Connecticut River Valley tobacco over that of most other States, is too well known to need comment, while the crop in this State is more than treble in value that of Virginia. Of hay we raise one ton in Massachusetts to one and one-half tons in Ohio, and one and two-thirds in Texas; but the crop in Massachusetts has been for years, when harvested, worth $25 per ton, Ohio, $12 to $15, and Texas, $16 to $18 per ton.

Although the soil of Massachusetts is often mentioned as being exhausted by over-cropping through a long series of years, yet in no State is the crop so varied, the quantity produced so large, or the harvest so valuable as in this State. California and Minnesota exceed us in the quantity of wheat raised acre by acre, but do not equal us in other products. Allowing these figures to be true, one may well contend that the cost is so much greater here than elsewhere, that the balance remains in favor of the South and West. Taking an average of the whole amount under cultivation, and of prices by the actual results, it appears that in Massachusetts, the value of produce per acre is $28, Ohio $18, and Texas and California $21 each. The aggregate amount is of course dependent on the area of land cultivated, but taken acre for acre, the result has been shown.

Even if we allow the financial advantages claimed by the friends of Western or Southern farming, still the balance remains in favor of Massachusetts, particularly when we take into the account the domestic comforts of the different sections. There, a small, rudely-built house, containing from one to three

rooms, without cellar and out-buildings, suffices for the comfort and enjoyment of the family, while the cattle are sheltered from the driving storms and piercing cold by a neighboring haystack or rail fence.

On a Sabbath morning behold the sturdy members of a Western family, gravely seating themselves in the farm cart or wagon (totally devoid of springs or other conveniences), behind a yoke of patient oxen, and then quietly wending their way five, ten or even fifteen miles to the nearest church, while the internal and external government of farm and household is on the same scale of magnificence, and our argument still is, that with the same amount of domestic discomfort at the East as at the West, the advantages of farming at the East are even more than our figures would indicate.

If farther comparison is needed, just the reverse of the picture already shown, our well-ordered, commodious houses, comfortable stables, fleet horses, light and easy carriages, and the general indications of thrift and comfort pervading a farmer's house in Hampshire County, and the case will speak for itself. Next, compare the transportation of the two sections, the result will certainly be in favor of the older State, there being two railroads within easy access, and a prospect for a third, in the county of Hampshire alone. Educationally it will be difficult to find a place possessing greater advantages, for in this county, in one single town, a person can begin and complete his education. If he wishes a practical, scientific education, fit for everyday use, or desires to follow some particular science, the Agricultural College will furnish the opportunity for that. Should he choose to become a farmer, and require a theoretical and practical exposition of the principles involved, the requisite means are at hand. If a profession is the object for which he is studying, he can enjoy great facilities at Amherst College, where he can have the benefit of a great library and extensive cabinets, together with a large corps of efficient officers.

Taking these privileges, and that of having good agricultural societies near at hand, we can but question the wisdom of an "intelligent, industrious and enterprising farmer" who concludes to emigrate from Hampshire County.

Mass. Agricultural College, Sept. 1, 1871.

DESIRABLE IMPROVEMENTS IN THE AGRICULTURE OF HAMPSHIRE COUNTY.

Prize Essay, by W. LIVERMORE.

An Athenian, being asked concerning the necessary requisite to successful oratory, replied: "In the first place, action; in the second place, action; in the third place action;" and if one were now asked the same question applied to agriculture, he might as strongly reply "Fertility."

The farmer who is determined to make a manifest success of his life and calling, to have agriculture the better for his having engaged in it, asks first of all, "If my land is not at its maximum fertility, how shall I put and *keep* it there?" He places this question and its solution above ease, above mere utility, above display or accumulated property. That our soil has not been thus consulted, our impoverished fields and diminished returns plainly declare. With each generation the smart young man or men, of the family, having well skimmed the old homestead, move westward or city-ward, leaving the worn-out land to be tilled by worn-out men, or by the nerveless, inefficient, "never-get-out-of-the-rut" portion of every community. Exceptions to this, happily, are growing less and less rare, and we trust as agriculture feels the march of intellect, as culture and science elevate and ennoble her walks, our native young men will stay by the old farms, and we shall see them cultivated, not for the results of five years or twenty, but for a lifetime, to be handed down to children and to children's children. This cultivation from father to son has largely contributed toward placing England's agriculture in the van, and its interests in our country demand its repetition in our older States. No more fitting State could be found to inaugurate this system than Massachusetts—always first in every good work,—no more fitting county of that State than old Hampshire, possessed of men,

front and foremost of farmers, and of an institution, front and foremost of agricultural colleges.

Therefore I would urge as the first essential improvement (not in this county alone, but throughout the State), the adoption of a more far-sighted policy in the cultivation of our farms. The capital and labor demanded for permanent improvements upon our rough New England fields will not pay in one year or three, and we are nearly all too selfish to cheerfully sow that others may reap. So our farmer, with the Yankee's love of change or trade,—always ready to "sell out,"—does not set out an orchard for some one else to pick the fruit.

That meadow paradise of frogs, reeds, flags, and all three-cornered grasses remains unimproved; for who shall reap the result? For the same reason, year by year he hoes and mows around those unsightly, profanity-tempting rocks. Finally, ten chances to one, old age and death find him on the same skeleton of a farm, graceless and rugged as of yore, and his sons long since disgusted with farming, as they saw and understood it, having turned to other pursuits, the blow of the auctioneer's hammer consigns the old homestead to strange hands, perchance to some thrifty son of Erin.

This is not a fancy sketch; you will find its prototype multiplied in every country town of Massachusetts. During the last decade our farming population has decreased in numbers, and our acres of waste land devoted to scrub oaks and alders increased. By comparing the official returns for 1865, with those for 1850, we find the unimproved lands of Hampshire County increased by 28,121 acres.

We find $10,000 gain in fruits, and 10,000 bushels increase in corn. We find a decrease of over 80,000 bushels of oats and rye, a less quantity of hay, and a large falling off in butter and cheese. Swine are reduced one-half, and with the exception of horses, farm stock is reduced in value. In total value, including improvements and buildings, we have gained $3,479,344, which we must largely lay to the credit of tobacco, which at our first date yielded about $11,000, at our later date $751,654. Here we see a falling off in those productions tending to sustain the natural fertility of the soil. Supposing that for the next twenty years the farmers of this county would throw aside all migratory intentions, manage their farms not to acquire the

largest amount of cash in hand for each current year, but for permanent improvements and maximum fertility in every field, possess themselves of sufficient faith in their profession to put their capital into it, accept the aids mechanics and science offer, bring every mental power to work in unison with their physical, and at the end of a score of years, they would at the same time, have shown our defects and applied the remedy. They would not only be richer in mind, honors and pocket, but their county would be the Eden of Massachusetts. Where individual examples have failed, their united influence could not but stir up the "dry bones" of our old fossils, who, on such farms as we first described, look with sovereign contempt at any innovation upon broad back and hard muscle, and furiously hurl rude wit, sarcasm and tobacco spit at "book larnin'," and "book farmin'." To what State can we more properly look for a true system of agriculture than Massachusetts?

Can her farmers show results commensurate with those attained in other pursuits? Have those in this county expended on their farms one tithe of the mental activity which has dammed and bridged our streams, founded our institutions of learning, or built and carried on our numerous manufactories? Can it be that we do not need it in a business which in its varied manipulations combines the application of almost every science and art? If by enterprise and industry, with skilled, scientific thought and observation to guide, we can increase our crops, develop and strengthen every latent energy of the soil, making our farms attractive to refined taste, and thus productive of a higher mental standard in our families and profession, it is not only pecuniarily but morally wrong not to do so. For we are not serfs to any prince or emperor, but as a Commonwealth of free citizens, whatever increases the resources and fertility of our lands, adds to our united prosperity. This subject cannot be too strongly urged. Although presented in agricultural papers and lectures until it appears as one-sided as a mirror, still our New England farms clearly prove the need and continued need of these exhortations. Let us labor to bring our farms back to their natural fertility, and to accomplish this, carry nothing from our fields to the granary or the market without returning its equivalent in fertilizing matter.

In connection with this subject, the question of large *versus*

small farms, might form an important item, did time permit. We read that Cincinnatus was as diligent and as successful at the plough as in the senate and army, but he refused a proffered gift of valuable land from the senators; for said he "I have already more than I can properly cultivate." His farm consisted of two and a half acres. Although our farmer may not so closely limit his boundaries for fear of violating the tenth commandment, would it not be better in the generality of cases (especially for those beginning), to work smaller space, throwing extra capital and yearly gains into its cultivation, until its fertility and returns are of the best? Then if the spirit moves, and your neighbors are willing, enlarge. I think the general management and results of large farms will prove this. Of course there are exceptions, for as in finance, in manufactures, in mercantile life, some men with the will, talents and training, will progress in extent and control of business, far ahead of their fellows, so it is in agriculture.

Special culture is another improvement. In this age of mental activity and progress, of rush and struggle for superiority, success crowns only him who concentrates every energy to the accomplishment of some one fixed purpose. The old "Jack-at-all-trades" is left far in the rear. Choose some one branch of agriculture, suited to your taste and position, then "fight it out on that line" if it takes,—more than Grant's summer—a lifetime. Is it stock raising, is it dairy farming, fruit culture, or market gardening? take which you please, at the end of a life's most careful study and observation, any little boy inquisitive for information, may ask you questions, vital in their connection with your business, which you cannot answer. The more men Hampshire County can show engaged in such special culture, the higher will be her agricultural influence and standing.

The breeding of pure blood stock, judging from your annual shows, offers ample field for improvement to special farmers in this county particularly tempting, by reason of easy access to thoroughbred animals at the State farm, whose superior qualities ought to be stamped upon all our herds. A name among farmers cannot be acquired in any shorter way than as a reliable breeder of pure stock, and as to money, knowing ones in this field have long reaped rich rewards, and the harvest is yet comparatively untouched.

The greatest improvement, however, may be made in the mental culture and professional training of the farmers themselves; in the doing away with old-time prejudices, in accepting the proffered aid of mechanics and science, with minds properly prepared to put it into practical use. If we wander upon the hills, back from the river towns, we find marks and tracks speaking as plainly of bygone ages as those treasured in the Hitchcock cabinet, but of a very different sort. We cannot put new wine into old bottles, neither can we expect the old men grown gray in the ways of their fathers to change their system. We must look to the young men. It is for them to infuse life into their profession, and impart to it the inspiration of the nineteenth century. Let the farmers of this county see to it that their sons are afforded every facility to enjoy the advantages of the liberal scientific training afforded by their own College,—that annually she may send from her halls back to the old homestead, graduates who can stand on a perfect equality with other educated men, and by their intelligence, industry and success command for agriculture the appreciation it deserves.

Massachusetts Agricultural College, Sept. 1st, 1871.

FARMS.

ESSEX.

From the Report of the Committee.

A great variety of agricultural or horticultural productions, from upwards of fifty different farms in the county, were brought to the society's annual exhibition at Ipswich, yet in only one instance was an exhibitor willing to submit the entire management of his farm, with its herds, its flocks, its fields, its orchard and its garden, to the inspection of the committee appointed by the society to examine and to report thereupon.

The reason for this general unwillingness to compete for the premiums offered for the best managed farms, is (in the opinion of the writer of this report) a general conviction in the minds of our most industrious and thrifty farmers, that they are somewhat "behind the times" in their agricultural management, while many of them must also be aware that they would exhibit to critical visitors a lamentable lack of system, order and neatness. So they content themselves with taking to the annual cattle show some of their best animals, fruits or vegetables, leaving behind them at their homes the evidences of their unprogressive or slovenly management, and permitting the "fancy farmers" of the county to carry off the premiums which should reward well managed industry—premiums which they might secure, if they would but temper their praiseworthy toil and their commendable thrift with more system and with some attempt at neatness.

But the "fancy farmers" who are thus permitted to "walk over the course," and to win the high honors offered by the society to all competitors, do something for the advancement of agriculture beyond demonstrating how commendable it is to have fences clear from weeds, to have buildings neatly kept, and to have "a place for everything, and everything in its place." It has been asserted, that while the working farmers of New

England are not inferior in natural intelligence to any other class of the community, they possess as a body less of that acquired knowledge which specially relates to the art by which they live, than those occupied in manufacturing or commercial pursuits. In Essex County, however, our yeoman have, during the past fifty years, been able to profit, when they so desired, by the visible teachings of their neighboring "fancy farmers," who, with no small outlay of money (and often for their own amusement rather than from any desire to educate others) have diffused valuable knowledge by experiments, generally profitless in a pecuniary point of view to themselves. As a general thing, a thrifty, industrious, working farmer, pays little heed to the theoretical harangues of any soft-handed man of leisure, but if he can witness, year by year, the results of a practical operation of these same theories, either good or bad, his sterling Yankee good sense leads him to adopt or to reject the example thus set him. In this way, the often sneered-at "fancy farmers" of Essex County have done great good, either by practically demonstrating that it is profitable to leave the same old ruts that have deepened year by year, for the highway of progress; or by conclusively proving how worthless are many of the much talked of fashionable agricultural theories.

Your committee, instructed to examine one of these so-called "fancy farms," witnessed its improvement and its management with great interest; and it is to be hoped that the following imperfect sketch of it may induce many of the farmers of Essex County, especially those owning low unproductive land, to make a personal examination for their own instruction.

The "Appleton Farm" is in Ipswich, about two miles south of the village, and on the line of the Eastern Railroad. It is a homestead, having been in the possession of the family whose name it bears since 1635, and it is now owned by Daniel F. Appleton, who is also engaged in successful business operations elsewhere, but who directs its management, much of which he personally superintends. The good results of his mercantile system, and of the methodical employment of capital in improving the estate and the stock upon it, are plainly visible, and demonstrate that it would be well for many of our successful working farmers to invest more of their gains from their farms in blooded stock, manures, labor and ditch-tile, rather than in bonds or

mortgages. The "Appleton Farm" contains about two hundred and fifty acres, of which fifty are bog-meadow, and eighty are rocky pasture. One of the committee, who was well acquainted with the farm before it came into the possession of its present proprietor, five years ago, stated that it then produced only about six tons of English hay, and twenty-five tons of fresh meadow hay. This year, it was estimated that Mr. Appleton had cut seventy-five tons of English hay, and two or three tons of meadow hay—the latter the product of the then last piece of unreclaimed meadow, which has since been ploughed. There were, in addition, considerable crops of corn, potatoes, turnips, carrots, cabbages, Hungarian grass, rape, &c., &c.

Mr. Appleton's chief aim, in his plans for improving his farm (as he explained them to the committee) is to show what can be done in reclaiming low wet lands, which he regards as the main future dependence of the farmers of New England for supplies of hay. His first step, after having had the low grounds of his farm surveyed, and the levels accurately taken, was to have a broad open ditch dug through them, with a sufficient fall to carry off the water emptied into it from smaller ditches and covered drains. This main ditch, which must be over a mile in length, and which has an average depth of at least three feet, is the foundation of Mr. Appleton's improvements, as it enables him to thoroughly drain all of the meadows through which it passes.

Having secured an outlet for the water, Mr. Appleton surrounded a meadow of ten acres with a "catch-water ditch," say, eighteen inches deep, leading, at long intervals, into the main ditch. This meadow had been kept constantly wet by springs in the headlands which surround it, but the plan of drainage was so successful that it was easily ploughed and laid down to grass. The committee walked over a part of this meadow, which was ploughed last fall for the first time, and sowed with herdsgrass in December. It had received a top-dressing, after the sowing, of a compost of loam from under pasture walls, mixed with ashes at the rate of thirty bushels to the acre, and a small quantity of barnyard manure. The committee differed in their judgment of the yield then on the ground, estimating it at from two tons to two and a half tons to the acre.

A piece of three acres, comprising a part of the above-men-

tioned ten acres, was a deep muck bed, and could not be ploughed in the condition in which it then was, four years ago. Mr. A. consequently determined to try the experiment of covering it with gravel, which was done by his farm hands and teams, in the leisure days of winter. The following spring it was sowed with timothy; the seed started, but there was no crop worth cutting that year. In the fall it was heavily top-dressed, with barnyard manure and thirty bushels of unleached ashes to the acre. The effect of these fertilizers on the mixed gravel and muck Mr. Appleton described to the committee as wonderful, as for the next two seasons he cut over three tons to the acre of the best quality of hay. This, he said, taught him the value of muck land, when mixed with the earth of the uplands, whether gravel, or sand, or loam. He does not, however, recommend to others the same treatment of similar lowlands. The heavy gravelling is too expensive to be profitable, and the same result can be much more cheaply reached by draining, then ploughing and laying down to grass. Last year and this, he is under-draining with tile, the same kind of land, and after having ploughed it, top-dressing it lightly with gravel. In his opinion, this muck-land does not require as "thorough" draining as heavy clay does—say sixty feet apart will do for the tiles. A five-acre lot of such land, which has been cleared of roots, and stumps, and alder bushes, last fall, so that it was ploughed and sowed in December, was making a good show of grass when the committee saw it. This piece had no other dressing than the ashes of the bushes and stumps burned when it was cleared.

This fall, ten acres more of this swamp have been ploughed, and (in this case) *before* draining. Another, and perhaps the most important experiment made by Mr. Appleton in reclaiming swamp-land, is upon a piece of thirteen acres, lying upon the line of the Eastern Railroad. This piece is "thorough-drained," with round tile and collars, thirty-three feet apart, and three to four feet deep; and a complete report on it by the Essex Agricultural Society's committee on under-draining, with a diagram of the work, was published in the society's volume of Transactions for 1870. It may be well to add here that this land is entirely unlike either of the pieces previously mentioned, having presented originally a broken surface of knobs and of pond-holes, with numerous springs. It consequently required a

different treatment to reclaim it, and, in place of the encircling "catch-water ditches," previously described, it was so thoroughly under-drained as to take off its own spring water. At the time of the committee's visit this piece was covered with a heavy growth of oats and of wheat (after a crop of corn, sixty bushels to the acre), which had been sown with grass-seed, and top-dressed with ashes and bone dust. Here was a judicious employment of capital, by which a comparatively barren, wet pasture had been converted into a level, dry, fertile field.

The dry uplands of the "Appleton Farm" are in the main treated as similar land on other New England farms is treated. The committee saw ten acres in corn, three in potatoes, and two in ruta-bagas, with say half an acre each of mangel wurtzels, and carrots and cabbages—all of which it is intended shall be consumed on the farm. These crops all looked well, and were free from weeds.

Upon some pieces of light upland, far from the barn, Mr. Appleton has tried the plan of top-dressing with "commercial manures," but the results have not been satisfactory, and do not indicate that such treatment is profitable. He is now trying another plan, viz.: He ploughed up, two years ago, a piece of light plains, manured it, planted it with corn in the usual way, and afterwards laid it down to grass. This grass was not mowed, but left for sheep to feed upon, to see if, with the fair start of feed which this treatment would afford the sheep, they would *improve* the land, while they fed themselves. He intends, after three or four years of this feeding, to turn under the sod, and to plant corn and ruta-bagas without manure. We shall see with what results.

On this farm two distinct and very different breeds of cattle are now kept, viz.: The delicate and beautiful Jerseys, and the rugged and hardy Kerries, of the relative profitableness of which for New England farmers Mr. Appleton has no doubts. In his opinion, the Kerries, considered only as *milch cows*, will produce one-fifth more milk in a year than the Jerseys; but, on the other hand, he frankly admits that the Kerries are very slow to mature, and that their calves are not more than half the weight they should be when they are of the age for the butcher.

After the 1st of July Mr. Appleton keeps his fourteen cows at

the barn all the remainder of the summer, feeding them on clover, green oats, and corn-fodder, sowed for that purpose. He admits that corn-fodder is not the best milk producer, but he don't see how he could get along without it, although he expresses his determination to try more Hungarian grass another year. He has adopted "soiling" as a *necessity*, his pastures being unequal to sustain all the stock he must keep in winter, to produce the large quantity of manure which his large farm requires. Still, he has no doubt of the expediency and economy of "soiling," by which he makes a very few acres sustain his fourteen cows during the summer, and he has a barn cellar full of manure in the fall.

Mr. Appleton's sheep are thoroughbred Cotswolds, of which he is very fond and very justly proud. He keeps them for the breeding of rams to be sold as stock animals, and the recent exhibitions of the Essex Agricultural Society have demonstrated his success.

The farm buildings are in good repair, and the implements were not only of the most improved kinds, but were evidently well taken care of, instead of being left to lie and rot where they were last used, as is often the case. The barnyard and cellars were well adapted for making manure, which is, after all, the great secret of agricultural success. There are now wintered on this farm sixty head of cattle, estimated by counting five sheep as equal to one cow, and four horses as equal to five cows. The swine, of course, perform their part in the making of manures.

Mr. Appleton believes in "*high* farming," and endorses the old assertion, that "if *high* farming will not pay, then *low* will not." Thus far, he says, he has only been *making a farm*, and it is his wish that the Essex Agricultural Society send its committee on farms, three years hence, to ascertain the result of his experiments, and his endeavors to get his farm in high condition. By that time he expects to be able to show that his pecuniary investments have not only been productive, but profitable.

The committee have seen in Mr. Appleton's management much that is worthy of high commendation, and they regard his experiments in reclaiming low lands—*viewed as experiments*—as of great value to the agricultural interests of Essex County,

where there is so large a proportion of comparatively unproductive swamps. They consequently recommend that the first premium of a diploma and thirty dollars be awarded to Daniel F. Appleton of Ipswich.

Dr. James R. Nichols kindly invited the committee, with the trustees and a number of prominent Essex County agriculturists, to visit his "Lakeside Farm," although it was not entered for premium. Had it been brought before the notice of your committee officially, they would probably have simply reproduced Dr. Nichols's own comprehensive accounts of his experimental agriculture, published in his valuable "Journal of Chemistry," and also those given in the agricultural address which he delivered at Amesbury in September. Applying chemical science to agriculture, Dr. Nichols has made inquiries into the causes of the fertility and barrenness of the earth, the food and nutriment of vegetation, the nature of the soil, and the best means of meliorating its condition. Recognizing the fact that it is as necessary for a good farmer to feed his fields as it is to feed his cattle, he has endeavored to ascertain what elements have been abstracted from the soil of his farm, and to restore them or their chemical equivalents. Your committee recommend that he should be rewarded for the experiments which he has so carefully made, and encouraged to continue them, by an award of the diploma of the society.

In conclusion, the committee must express an earnest wish that the working farmers of Essex County may be induced to compete for the premiums of the society for "the best managed farms." Our wealth owes its origin to productive labor, and if some of our thrifty yeomen would tell how they manage their farms, often small in extent, and what their profits are on the amount of capital invested therein, it could but increase the number of cultivators of the soil. It may be safely asserted that every industrious, temperate farmer in Essex County who scatters the seed in faith, reaps the harvest in joy; and that although manufacturers and merchants occasionally draw prizes in their lotteries of life, the farmers enjoy health, contentment, independence, and a competence—the true earthly elements of human happiness.

Ben Perley Poore, *Chairman.*

WORCESTER NORTH.

From the Report of the Committee.

Only two farms were entered to compete for the society's premiums; one by Daniel S. Eaton of Fitchburg, the other by Alden Derby of Leominster. These farms have been visited by your committee annually, and inspected in their various departments, that we might have a general knowledge of their management. But the two farms are so dissimilar and require a management so unlike each other, that we shall be excused for entering more minutely into detail. Mr. Eaton's farm contains sixty acres and is well fenced with stone-walls, and is managed by his own labor, and when he finds it necessary to have some additional help, he exchanges and works for his help to pay them, so that no part of the income of his farm has to be appropriated to pay running expenses for labor, which circumstance is of very rare occurrence nowadays. He has unearthed the boulders and smaller stones from his fields, made the rough places smooth in his mowing lots, so that the mower will run to advantage on all his grass lots, with a very small exception. He cultivates wheat, barley, Indian corn, potatoes, turnips, beets and other vegetables, keeps his fields clean of weeds, keeps four or five cows, makes butter for the market, has an apple orchard, keeps swine, some for market, also about three dozen hens, selling one hundred dollars' worth of eggs in a year, has pears, grapes and peaches, sufficient for his family use.

Living on "Alpine Hill," any one looking around from his stand-point might suppose him to be "monarch of all he surveys." We noticed a nice field of German sweet turnips growing beside ruta-bagas; the sweet turnips are much more thrifty than the bagas, showing a decided superiority over them, with the same culture. Also, we noticed this year a prolific field of the common flat turnips adjoining the above.

We might go on and make an extended report of Mr. Eaton's farming operations; but his written statement accompanying this report, will amply suffice.

Mr. Derby's farm contains about one hundred and seven acres and is managed in a manner that requires much extra help. Mr. Derby is reclaiming a large swamp, by ditching extensively, that is covered with bushes that "require more hands than his

to lop their wanton growth." He raises potatoes for the early market, and cabbages, carrots, beets, the best for the market, the poorer qualities for his cows, about a dozen in number, that are ke t for the sale of their milk. He has adopted the practice of soiling them. In the warm weather he lets them run a few hours in the pasture, then puts them in his barn and feeds them with green fodder, such as early-cut rye, fodder corn, refuse cabbages and leaves, beet-tops, &c., as they come to growth. We noticed two acres of winter rye, sown for next spring's feed, two acres of fodder corn, two acres of cabbages, the best for market, the smaller heads and leaves for forage. By this method of feeding, he makes large quantities of manure to fertilize his fields, which he has cleared of stones at a considerable outlay. He cultivates the strawberry and other small fruits, cuts about thirty tons of hay yearly, raises his own wheat for flour and often has many bushels for sale.

Your committee called upon each of the competitors to make a written statement of their farming operations somewhat in detail. They have responded by submitting their statements to us. Their statements do not show us exactly a cash balance for their operations,which is a desideratum in *farming accounts*. For example, Mr. Derby shows the number of tons of hay he cuts, but the hay is consumed to make milk and butter.

CYRUS KILBURN, *for the Committee.*

Statement of Alden Derby.

My farm contains 107 acres. About 30 acres are in shape to cultivate; 20 acres pretty good pasture; 30 acres poor, run-out pasture producing but little feed, and 27 acres swamp, good for nothing at present for farm purposes. When I commenced here six years ago, I adopted "mixed" farming, with stock and dairy taking lead. I was convinced that we could not depend upon our old pastures, which had been cropped year after year by milch cows, without having anything returned to them, for a profitable supply of summer fodder for our stock. Two systems presented themselves for consideration: one, to plough, seed, mow two or three years, then pasture, then plough again and go on as before. This would require the farm to be fenced off into fields. The other was soiling, by which I could save manure and dispense with cross fences.

I chose the latter, to be adopted as soon as I could get my land into shape to warrant it. I have tried it the past season and like it. Here let me say, I think that on our dairy or milk farms, in this section where the greater part of the land can be ploughed, soiling will be practised at no distant time.

Writers on soiling have recommended green corn to be fed exclusively in its season. I believe this to be a mistake. So far as my experience goes, cattle cannot be well kept for any length of time on corn alone. I would feed, per day, three times green corn, once dry hay, once green oats, clover or cabbage, according to season. Next spring I shall begin to feed rye as soon as it is a foot high, then pasture while feed is good, then feed oats, corn cob, &c., in the barn.

I have at present for stock, ten cows, seven heifers and calves, two oxen, a horse, about a dozen swine, &c. I raise my best heifer calves using Ayrshire to cross with Native. I have been using Essex swine to cross with Native; find them far ahead of anything I ever had before. I raise potatoes, cabbages, winter wheat, rye, oats and corn for fodder, and a supply of garden truck for family use. Wheat in 1870 yielded thirty bushels per acre; in 1871 got winter-killed; cut it for hay.

This farm, like many others, had numerous stone walls running in every direction, without regard to order or shape of fields, of double and treble thickness, and lined with brush and briers. As soiling was my object, I have taken every opportunity to remove these and have nearly all the inside ones cleared off. I have cleared nine acres of old pasture, at a cost for ploughing and getting out and drawing off stone of from $75 to $100 per acre. I have now about thirty acres that I can cultivate. Believe in having land in such shape that it can be thoroughly stirred; first drained, either naturally or artificially, then thoroughly cultivated; then we get a full benefit of our manure. Drainage, manure, thorough cultivation, are the three great things. I have made plans to drain my swamp and commenced, but no results yet; only a beginning. I shall use tile; have used stone to drain portions of upland, but it is too expensive, and, withal, unsatisfactory.

My gross receipts for 1870, were $2,748.34; for 1871, $2,736.82. Paid for labor, 1870, $706.62; for 1861, $920.71.

Finally, gentlemen, to fix up a run-down farm, with poor

buildings, without capital to start with, is up-hill work; but to remove an old wall, to clear up a field of brush, to dig and blast out stone and make everything smooth, to drain a swamp producing nothing but brush, frogs, mosquitoes, snakes and all sorts of filth and slime, to make it produce three tons good hay per acre each year, has for me a peculiar charm which can be found in no other department of labor, and besides, it must pay in the long run.

ALDEN DERBY.

Statement of D. S. Eaton.

My farm, which was entered for premium in 1869, contains 60 acres; about 24 in mowing and tillage, 26 in pasture, and 10 in woodland. I cut, on an average, about twenty tons of hay, using Wood's one-horse mower on all but about one acre. I usually have some surplus hay to sell. I raise about twenty bushels of wheat annually, called coffee wheat, and generally corn enough for family use and for fattening my swine. I have raised none this year, however, believing that when a ton of hay will buy a ton of meal, it is better to sell hay and buy meal.

Last fall I ploughed $1\frac{1}{4}$ acres of greensward, and this spring put on about thirty loads of manure to the acre; harrowed and sowed $\frac{1}{2}$ acre with grass seed and barley, from which I threshed twenty-six bushels of barley. The remainder I ploughed this spring, manured, and sowed 15 rods with Swedish turnips from which I raised seventy-six bushels. The rest I planted with Early Rose potatoes which yielded me ninety bushels. In June I broke up an acre of grass ground, manured and planted $\frac{1}{3}$ of an acre with fodder corn, from which I raised a heavy crop. July 20th I manured and sowed English turnips on $\frac{1}{3}$ of an acre, and harvested twenty-five bushels. I cultivate garden vegetables enough for home consumption, and some for the market.

I keep four cows, a yoke of steers, two or three other young cattle, and one horse; also, about three dozen hens from which I sell about $100 worth of eggs per year. I feed them with refuse fish from the market, in addition to their other food.

I commenced, after haying in 1869, to ditch and level about an acre of rough mowing, ploughed the knolls, took out the stones and left it on account of heavy rains. In August 1870, I finished ditching and levelling, spread on a coat of manure and

sand and seeded to grass. This year I cut two heavy crops from it.

I have removed boulders enough from my fields to lay about twenty rods of wall, and as I had no place of my own to build, I gave them to my neighbors. I have taken out the last stone that was in the way of the mower. As I have no muck, I use sand instead mixed with manure, and think it works well on most of my clay-bottom land. I hire no help, but do my own work by exchanging with neighbors.

My gross sales for 1869, were $423.30; for 1870, $801.94; for 1871, about $400.

DANIEL S. EATON.

BERKSHIRE.

From the Report of the Committee.

The total number of entries in our department this year was 81, divided as follows: 39 farms, 20 dairies, 6 apple orchards, 11 collections of fruit trees, and 5 reclaimed lands. In the first place we desire to say that we are satisfied that the premiums offered in this department, especially those for the best managed farms, are exciting a very healthy influence on the agriculture of the county. We notice a very decided improvement in the management of the farms that have come under our inspection. Buildings and fences have been put in good repair, cleaner and more thorough cultivation has been introduced, better stock is kept, and an air of neatness and thrift characterizes the farmers' premises. How much of this improvement is due to the stimulus furnished by the offer of premiums, and how much to the general spirit of progress which is abroad in the land, we do not pretend to know, but that there is a generous emulation among the farmers of the county is very manifest, and it is equally manifest that it is in part due to the annual examination of the farms by this committee, and to an ambition for the honor which the award of the premiums confers.

We have been particularly gratified the past summer in noticing the many commodious and convenient barns that have recently been erected in the county. Of these the largest, and one of the most perfect for ordinary farm purposes, is that of Mr. Charles A. Howland of Adams. This barn is 173 feet long

and 50 feet wide, the posts 32 feet high, with wing 43 by 20 feet, the whole resting on a basement with solid stone walls on three sides 8 feet high. The entrance and driveway are in the third story, with bays on either side 24 feet deep, so that it is comparatively an easy matter to stow away the 150 or more tons of hay which Mr. Howland annually cuts. The barn being situated on the south side of a hill, the access to the main barn floor is not so difficult as might be supposed, and the egress is accomplished at the other end of the driveway, without backing or turning around. The stabling is on the first floor above the basement, where the herdsman finds the hay accessible, as also the roots. Few farmers have the advantages of location which Mr. Howland possesses, but all can obtain suggestions from the examination of his barn, which might enure greatly to their advantage. It is due to the memory of the late Mr. Isaac Howland, the father of Charles A., to say that the plan of the barn is mainly his, and is the result of his study during a life of threescore and ten years. He lived to see his long-cherished plan partially developed, but died before the building was completed.

The barns that have been built within the past year by Messrs. A. O. Hodge and A. J. Bucklin of Adams, Henry Noble of Pittsfield, and H. D. Palmer and W. H. T. Mali of Stockbridge, deserve mention, not only as specimens of good barn architecture, but as evidence of improvement in this essential of good farming.

In our former reports we have taken occasion to speak of what constitutes good farm management, and of fruit culture, and we desire now to say a few things about barn architecture, as this subject is evidently and deservedly receiving increased attention from the farming community. When our fathers first came to New from Old England, they bestowed little thought, or expense, on shelters for stock. This is not to be wondered at when we consider that they came from a comparatively mild climate, where most of the hay and grain is stored in stacks, where the turnips and other roots are mainly fed on the ground where they grow, and where sheep and neat stock are frequently not housed at all during the winter. The pioneer settlers of New England soon found from the great losses of stock from exposure to the severity of the winters, that shelter was a neces-

sity to successful farming, but the structures they at first put up were rude in the extreme. The Puritan barn was generally an oblong building, varying in size with the extent of the farm, resting upon no very stable foundations, the underpinning allowing a free circulating of air under the feet of the horses and cattle, and the siding, being made of green hemlock boards, shrank so as to admit the wind and light, thus avoiding the necessity of ventilating tubes and all patronage of the glazier. This style of barn architecture has continued in fashion more or less to the present day. We are rejoiced, however, to know that the march of improvement has commenced. Cellars to barns are now considered by intelligent farmers almost as essential as cellars to houses. The wide cracks that formerly let the cold winds upon the stock and the air upon the hay, damaging the latter almost as much as the former, have been battened, or tight siding has taken the place of the old shaky and warped hemlock covering. It is found that in a tight mow, hay is preserved much better than when the air circulates on all sides. It is also found that a warm stabling saves much food; for a good share of the fodder was spent in keeping up the animal heat.

The four principal purposes to be accomplished in barn architecture are: commodious storage for the crops, comfortable quarters for the stock, convenient performance of labor, and the economical saving of manure. Many of our farms have too many outbuildings, a barn here, a barn there, a granary in one place, a pigpen in another, and a hennery in still another. As a general rule it is more economical and convenient to have all the offices of the barn under one roof. Said an old and wise farmer to us once, "Many men put on more shingles than they can support. The same roof will cover a basement and two stories as well as one story, and the less siding you expose to the weather the better." We desire particularly to commend basements to barns. They give a solid foundation on which the superstructure can be reared without fear of its becoming lopsided or travelling off with the winter's wind or frost. They furnish warm stabling for stock, safe housing for roots, and shelter for manure. There is a possibility, however, of securing warmth in basement stables at the expense of light and air, and consequently of the health of the stock. We have been in

some basement st'a' les where the air was so foul that we were conscious of breathing poison. No animal can thrive where there is not a good circulation of fresh air. This can be secured by having ventilating tubes run from the basement to the roof of the barn. With these should be connected tubes bringing in fresh air from some lower elevation. The heat of the animals will cause a current to run up the higher tube and produce a rush of fresh air into the stables from the lower tube. Not only will the stables thus be benefited, but the effluvia from the fermenting manure will also be prevented from passing through the barn and contaminating the hay.

Next to air and food, we place sunlight as essential to the health of stock. The inferior animals, as well as man, delight in a sun bath. A cow basking in the sun and chewing her cud demurely with her eyes half shut, seems to be in the paradise of cows. Precisely what is the subtle influence which sunlight exerts on both vegetables and animals, chemists have been unable fully to explain, but that there is an influence, and a powerful and salutary one, all must have observed. The plant growing in the shade is pale and watery, deficient in woody fibre and the mineral elements which give it strength. To the animal the sunlight is still more important, as its organization is more delicate. If any one wishes to know how congenial to man is the light of heaven, let him be shut up in a dark room, or dungeon, for a few days. The farmer who confines his stock in dark stables day after day is not only depriving them of much enjoyment, but of one of the great essentials to health and thrift. The stables should therefore be on the south side of the barn and be well glazed.

Barn architecture has been studied but little, and as a science has been reduced to little system. We have books on the Corinthian, Doric and Gothic styles of architecture for the homes of men, but to the home of the beast, architects have paid comparatively little attention. A tasty, commodious, convenient and economical barn is the want of all farmers, but so little has the art of barn building been developed, that scarcely two farmers can be found who will agree as to what constitutes a model barn. The subject is certainly worthy of more consideration, both from architects and farmers, and the barns that have been erected in Berkshire County within a few years, both by amateur and prac-

tical farmers, will serve to draw attention to this important adjunct of a good farm establishment.

OREN BENEDICT, *Chairman.*

BRISTOL.

From the Report of the Committee.

The committee on Farms and Crops, in making their report, are pleased to notice a growing interest among farmers in general, not only in regard to the excellence of their crops, but also in the skill and economy of raising them. That there are very few farmers who can afford to grow an inferior, or even an ordinary crop, is a fact which is being practically acknowledged. Less land, with more manure and better culture, has to a great extent become the motto of all successful farmers.

The labor question, or the item of labor, so intimately connected with every industry in the community, is of vital importance to the farmer. The prices of farm produce have assumed the old rates which were common before the war, while the prices of labor, which were inflated by the war, have not receded in the least, though the causes, or the most of them which produced the inflation, have long ceased to exist. Hence it is plain that the farm laborer has acquired an advantage over his employer which he does not mean to relinquish, and which, but for the use of agricultural machinery, would render it absolutely necessary to abandon farming as a business. Economy in farm labor therefore has become a necessity, and he who practises it the most rigidly, will be the most likely to make farming pay. In fact, we believe that there is no business which, if conducted with a sole view to profit, requires so shrewd management as farming. The preparation of the soil, the selection of seed, the choice and use of fertilizers, the application of labor, the mode of culture, and the final harvesting and marketing of a crop require constant vigilance on the part of the husbandman. One misstep, or a slight mistake, will often prove fatal to success. Equally fatal are causes almost wholly beyond our control; such as the drouth, the frost, the blight and mildew, and the destructive insect. The skill and ingenuity of the cultivator are constantly taxed to counteract their damaging effects.

In view of these facts, the importance of farmers associating themselves together for mutual improvement and mutual benefit becomes really apparent. The necessity and importance of accurate experiments in every department of agriculture, and of clear and careful statements in everything pertaining to the breeding of domestic animals, and to the growth of plants, is not overrated by agricultural societies when they offer liberal premiums, for the purpose of placing such valuable information before the public. This matter was partially discussed by your committee in a former report, and we had thought that the principle upon which premiums were offered and claimed, was generally understood; but we find in the award of premiums at our late fair this important principle in many instances was completely overlooked. One gentleman, for instance, received something over fifty dollars for simply *exhibiting* a pair of fat oxen.

Now, let us inquire what the society has received for this liberal bounty. Is the making or fattening of beef in Bristol County a profitable business? What particular breeds are best for feeding, and most inclined to take on fat? What is the best method of feeding, and does cotton-seed pay better than Indian meal? What is the net profit or loss accruing from feeding the cattle on exhibition? These are questions of vital importance to every farmer, and who should be required to answer them correctly but he whom the society is willing to pay liberally for such important information?

Your committee are aware that this matter does not strictly come within the scope of their official duties, and the only excuse offered for this digression, is the ardent desire they have that the society should receive at least a partial equivalent for its liberal premiums.

The past season has been one of general prosperity with the farmers of Bristol County. The crops, with but few exceptions, were good. The hay crop, though light, being about two-thirds of an average, was cut early and stored in excellent order; the cereals were quite up to an average; apples were almost a total failure throughout New England; but other fruits, and vegetables of all kinds, were abundant and of excellent quality.

A. P. Slade, *Chairman.*

UNDERDRAINING.

HAMPDEN.

Statement of J. W. Adams.

Land that will grow pear-trees is esteemed by pomologists to contain the elements of success in horticulture, which are with the most difficulty, artificially applied. It must have moisture always under control. It must be well-stocked with organic and inorganic constituents of growth.

That the growing of pears for profit might be a reasonable venture in the fertile valley of Connecticut, I became convinced by examination of the city gardens and farms adjoining; and this conviction was confirmed by frequent comparison with the neighboring towns of Boston, of Worcester, Hartford and other places already celebrated for the abundance and excellent quality of this fruit.

After nearly three months thus spent in forming an opinion, and deciding upon a "base of operations," there appeared in one of the Springfield daily papers, early in September, 1867, an advertisement, as follows:—

WANTED.—Within two miles of City Hall, seven to ten acres of land, rich enough to grow pears. Address Box 146, P. O., with particulars.

To a stranger about town, and one somewhat dreamy from lately reading the landscape gardening essays of Downing, Ik Marvel and others, it need not be said that in response to numerous invitations, prospecting was done in various directions with only trifling evidence of success. The lot at last selected was against the doubtful assent of some friends, who thought it cold, wet and forbidding. "The best located part of it on Main Street," said one adviser, "can never be planted earlier than June, and the street is built so much above it, that it cannot be drained." To balance, it was suggested that credit ought to be given to the swiftly running brook, sparkling with its crystal waters, with its deep pools and waterfalls continually attracting to its depths every bare-footed boy and girl, who could ingeniously frame an excuse to travel by its banks. Fish-ponds and their profit were also mentioned, and the imagination did not

omit the fountains to arise amidst stately and dignified pears, or portly apples growing aloft, yielding a large percentage of pleasure to be added to the more popular dividends previously enumerated.

The lot, too, was well situated to be irrigated, whenever our agricultural teachers—the editors—can produce testimony that such investments are equivalent to government bonds.

In buying a residence, there are many things to be considered besides health, which is of first importance. It is a custom to look for good neighbors, so if one drops a spade or a crow-bar, it will not be snatched up immediately, and buried until the excitement is past. It would be pleasant to be able to tell your friends just where you live on an aristocratic street, and next door to Judge Hardpan's; and that the hourly will leave you at the gate. To say that you live in Brunswick, that your post-office is South Durham, and your express packages must be left at Freeport, requires a long memory, or the names and offices might frequently be transposed, and your business correspondingly. And finally one is careful to ask the owner why he wishes to sell his property, if there are slaughter-pens, or any other indispensable establishments—commonly called nuisances—situated near him.

Buying a place for a commercial garden, requires many, if not all, of the above requisites, and some in addition. That it might not be too far from town, all of our rambles were made on foot. The main street was esteemed a valuable consideration on account of its publicity and ease of access. How few people know of your business and locality may seem surprising. Were we permitted to carry on our business here successfully for ten years, with name constantly and daily advertised, and on the most prominent thoroughfare, it is doubtful if one-half of the people of this city would know, at the end of that time, where we were located, or that such an establishment existed.

Having decided upon the locality, and completed the purchase early in October, underdraining, which had previously been determined upon, if accomplished that autumn, must be commenced without delay. Accordingly, men were engaged to do the ditching, and tiles were purchased. The latter were all of the sole pattern, which are in all respects superior to the open, or horse shoe tile; but my later experience is in favor of the

round tile, when it can be obtained. Tiles five inches in diameter were used for the main drain, and two-inch tiles for the smaller. One hundred feet of the main, however, where it crossed the street, going one foot below the bridge through which the brook ran, was laid with six-inch cement-pipe.

For ordinary draining, I do not esteem these, in any respect, better than common red tile, provided the latter be well made and *hard* burned.

It was necessary to cross the street to get depth, and only eighteen inches at one place could then be obtained, the tile being laid nearly level for two hundred feet. When three feet of earth could be put above the tile, no attempt was made to go deeper, excepting to pass through swells and hillocks to low land beyond ; always commencing at the outlet and finishing at the top.

Skilled laborers, at double wages, in difficult drainage, are cheaper than common hands. Commencing, as I did here, with such help as could be found at the street corners, there were numerous embarrassments and hindrances. Ditches were dug too deep in many places, and where soft places occurred, it were easier to dig a new ditch and abandon the old one, than to try to fill up to the proper height. The method I adopted, was to cut a shelf on the side, level with the water in the ditch, which was used as a guide. Strips of four-inch wide hemlock boards were used over mucky spots, to keep every tile in place ; for if one end of only one tile were tipped down out of the grade, the whole drain might be ruined.

Laying of the tiles, and pounding them firmly down, is one of the most important items. It is a mistake to leave the ground loose, that the water may find its way into the drain. To put clay against the tile when it can be obtained, and then to fill up the whole drain as if the object were to keep the water out, is a better and the true way. Neither tarred paper nor newspapers, which are sometimes put around the joints, were applied here, except in one place of twenty feet, where quicksand would otherwise have filled the tiles. When the ditch was filled, back furrows were turned over it, causing the ground to be higher over the drains, that no water should seek to enter the tiles from the top. In all successful underdraining, the water must enter from the bottom.

Ditching by the rod is the correct way of employing help in systematic draining. One of my men, who was much superior to the average, was allowed to work by the day at $2, or by the rod at 25 cents. He would usually dig nine rods in a day, and with the common tools I then had, it was a good day's work. The ditches averaged three feet in depth, and as narrow at the bottom as the *digger* pleased to make them, the soil being thrown on one side and the subsoil opposite. I have since used draining tools which cut only four inches wide and five feet in depth, when required, and effect a saving of labor principally in filling the ditches.

On the upper part of my lot, small drains have been made, which run directly to the brook. Strips of hemlock boards are used at the outlets, as tiles are apt to be displaced. The boards were taken to the mill, and an equal number of pieces were sawed two, three and four inches wide, and in the winter nailed together in the form of a triangle. Whole drains were made in this way, one season, to lay about five hundred feet, because tile could not be had, and they are the next best substitute. Placed under ground, and constantly wet, they will last a generation, but they are not as durable as tile, and more expensive. In one drain at the side of a hill, I was obliged to use them, as we encountered a spring that in a week's time did not diminish, and the water could not be kept out long enough to lay the tile successfully. Tiles or boards are either of them cheaper than stone, even when the latter is in the field.

CHARACTER OF THE SOIL.

Numerous wet places were found before draining, which were the result of two causes. 1st. At the foot of the hills. 2d. Basins which were surrounded by hard pan, or clay. Because the water could not run out freely from these pockets, the land was cold and unproductive. One place, of a rod in extent, was so compact that a strong team could scarcely force a subsoil plough through it. Forty feet was adopted as the distance apart for the drains, and the direction up and down the ascent. And in only one instance did I allow the drain to make a right-angle and terminate vertically at the surface to admit the continual passage of air.

COST OF TILES, LABOR, ETC.

100 feet across Main Street, 6-inch cement pipe and cartage,	$25 00
Laying the same, 6 feet deep,	16 00
300 5-inch sole tile, 13 inches long, and cartage,	15 00
1,700 3-inch " " " "	42 50
900 1½-inch round tile, " " "	16 75
500 boards, triangular form,	12 00
Labor (estimated in part),	210 00
Total (3,642 feet),	$337 25

Some of the results may be stated to be that the following March an acre of this lot was ploughed, and work has been carried on over the whole tract ever since, with not more than two days' interruption after a storm or shower terminated. Two years ago when the freshet followed the heavy rain of October, the brook overflowed, because the bridge was not sufficient, covering several acres, in some places two feet deep. A large part of this overflow must have passed through the soil into the drains, and it is strong testimony to their efficiency that in thirty hours' time the surface of the ground was above water. "Now that your lot has gone through two wet seasons and never too wet, you will certainly be all right for a dry summer," a remark of a Chicopee merchant who had doubtingly watched our work from the beginning. Last season came the drouth, and "never known so dry," says the oldest inhabitant, with this result. One block of six thousand dwarf pears made an average growth of four feet, while strong growing varieties, like the Louise Bonne, grew six feet; and this season, which has again been wet, the result is the same.

Without making comparisons which circumstances constantly change, my observation leads me to affirm that lands which need underdraining are the best and cheapest New England lands we have. On such soils no perceptible difference exists in dry or wet seasons. Less manure is wanted, the season for *it* is extended. It is warmer. Air permeates the soil, and decomposes the organic matter earlier, for the food of plants. The land is always ready for a heavy rain, for the surplus water to the depth of three feet has been taken out; and for raising

maximum crops of hay, vegetables or fruit, such land, thoroughly underdrained, is a safe investment, and with my own specialty, the cost has not exceeded the compensation.

FERTILIZERS.

FRANKLIN.

Statement of Levi P. Warner, Sunderland.

The object of the experiment was twofold : first, to test the comparative value of different kinds of fertilizers, and second, to determine whether a liberal application of commercial fertilizers could be profitably made on land that had been sufficiently enriched with farm-yard manure, to produce good crops. The piece of ground upon which the experiment was tried had been previously manured and sowed to onions. The commercial value of the several kinds of fertilizers used was at the rate of $60 per acre, one-half being strewn between the rows May 4, and the remainder, July 20. The yield of onions on each of the plots of ground was as follows :—

	Rate per acre, bushels.	Gain per acre, bushels.	Cost per bushel, including expense of harvesting.
Where no commercial fertilizers were applied,	520	–	–
Where Peruvian guano was applied, . .	720	200	$0 36
Where Chicago bone was applied, . .	680	160	43¾
Where Bradley's X.L. phosphate was applied,	740	220	33½
Where Bradley's sea-fowl guano was applied,	800	280	27½

The onions were sold for 65 cents per bushel.

Statement of D. O. Fisk, Shelburne.

I prepared two acres of common tillage land (worth $50 per acre) for a crop of corn, by spreading on 20 loads of manure

from the heap to the acre; ploughed it in and harrowed it thoroughly, then planted the first four rows without any commercial fertilizer, then four with a spoonful of Wilson's phosphate in each hill, three feet between the rows and hills; next four with the same quantity of Bradley's superphosphate; to the next four I applied Fale's fertilizer, of New York, in the same manner and quantity. The land was fitted and manured as evenly and alike as possible; up to the time of the first hoeing the Fale's fertilizer was ahead, the corn looking a little the darkest green. At the second hoeing, the 20th of June, it was very even: all looked splendidly, save the neglected rows with no warming stimulus to start them; they looked pale, cold and sickly. At the last hoeing, about the middle of July, most judges thought the Bradley corn was the best, which at harvest-time proved to be true. The rows averaged two hundred and fifty hills each. The rows with Wilson's and Fale's fertilizers yielded *six* bushels of ears, fully ripe, to the row; Bradley's *six and one-half to seven.* The only soft corn came from the rows with no commercial fertilizer, and these gave *five* bushels of ears to the row.

For the last ten years I have used these and other fertilizers on my corn with good effect, and, I think, with profit, though purchased at the enormous price of $55, $60 and even $65 per ton, always giving sound corn two weeks earlier than without them. If these fertilizers could be bought at a fair price, I should use them as a top-dressing on grass land, but have not found them to pay as well so applied, as when used as a stimulant for corn. Let me close this statement by saying that my corn does not cost me over 50 cents per bushel, when raised in this way.

ORCHARDS.

MIDDLESEX SOUTH.

Statement of John G. Morneburg.

Encouraged by receiving the first premium on apple orchards, in 1858, I decided to set out another one. The land I had left

for that purpose was a light, dry, sandy loam, very poor and without stone, rather unfavorable for apple-trees, but I made up my mind to try it.

I took into consideration the land and what kind of trees I would set; concluded to set them nearer than my other orchard, and dug my holes twenty by twenty-five feet apart. This orchard contains eighty-five trees,—sixty Baldwins, ten Hubbardston Nonesuch,—the rest, four different kinds. I purchased them in Sherborn, two and three years from the bud, and set them out in the spring of 1860. I dug my holes seven feet wide and two feet deep, placed at the bottom of each tree half a bushel of whole bone, mixed half a horse cartload of meadow muck and one peck of wood ashes with the loam I dug from the hole, then was careful to have the roots in the same position, but six inches deeper than they were in the nursery. I shook the trees well, poured a pail of water in, and trod the earth gently round the roots. I washed them for six years in succession with whale-oil soap and fine sand, and since then, I scraped them the last week in June. I slit the bark of every tree on the north side the second year after setting them out. I pruned them just before washing, and tried, if possible, to have the lowest branches from five to six feet from the ground. The last three years I pruned late in the fall and painted over each wound I made; those I pruned in the fall did not bleed, and those I trimmed in the summer, and used no paint, did.

In setting my trees nearer together than thirty-three feet, I knew, from the nature of the soil and the tree, with my treatment, that I should not get a wide-spread top, but the trees would bear earlier; and it proved so. Since 1865 I have had a good show of fruit, and last year they were all loaded; but the dry weather and over-bearing of last year has spoiled the crops of this. I cultivated the land with corn, potatoes and white beans, seven seasons, and four seasons in grass. I used muck and ashes very freely, and always spread the manure and ploughed it in; never let any grass or weeds grow within three or four feet of the trees, and kept constant watch of all kinds of insects. Four years ago the cankerworms made their appearance, but tar paper and printers' ink, with a determination to get rid of them, soon cleared them out; and if my neighbors were of the same mind there would be none in this neighborhood.

I am satisfied, from experience, that tar paper and printers' ink is a sure remedy for cankerworms, if it is put on in season and *always kept soft.*

JOHN G. MORNEBURG.

Statement of Daniel Ryder.

The apple orchard I offer comprises two hundred trees, and will be eleven years old this fall. There are seven varieties, viz.: Williams, Baldwin, Gravenstein, Hubbardston, Russet, Tompkins' Sweet and Northern Spy. The land is light clay soil, and is on a high elevation sloping to the north-west.

Previous to setting out the orchard, the holes were dug four feet square and the loam on top, about a spade deep, was thrown out by itself and the remainder put in another pile. In setting out the trees, the loam which was taken from the top of the hole was applied around the roots and little fibres of the tree. After setting, the trees were topped about one foot. Ashes and barnyard manure have been the fertilizers. Trees pruned in June produced fifteen barrels last year, splendid apples, Hubbardston and Baldwin. In regard to insects, the borers have had to succumb by the application of a bent wire, the only effectual instrument, in my opinion.

PEACH ORCHARD.—This was three years old this spring and blossomed full. They comprise two varieties, Early Crawford and Late Crawford. The land slopes to the west and is a very light soil, but deep. The fertilizers used have been principally ashes and peat mud. The peat mud I consider an indispensable article around the peach-tree, especially on land of light soil, as it holds the moisture. In regard to pruning, I believe August is the proper time, as then there is the greatest flow of sap. I believe ashes are death to peach insects of all kinds. Whole number of peach trees in orchard, two hundred.

When I set them out great pains were taken; I soaked the roots and sprinkled ashes upon them, and after they were set, cut the whole top completely off. It bore some peaches last year.

DANIEL RYDER.

WORCESTER NORTH.

From the Report of the Committee.

If one would succeed in pear-growing, he must not only have an interest *in*, but a desire and taste *for* it. Simply because Mr. A or Mr. B, or some other pear-grower, by his study, perseverance and hard work had succeeded and acquired a livelihood by growing pears, it is no index that another individual will succeed by transplanting the best of trees in soil well adapted to their growth, without farther exertions on his part.

Therefore, we would say to the young farmer, or pear-grower, that the first matter of importance is suitable soil; and as far as our observation goes, we would avoid hungry, gravelly, or sandy soils. Low, sunken and swampy grounds are also to be excluded. We have noticed pears to make very good growth, and appear to do well, on alluvial soils, for a few years, and then almost entirely fail. As a general rule, then, we should say, select a surface soil of black loam and clay, or clayey subsoil, which should be thoroughly underdrained, either naturally or artificially; and what should be understood by thorough underdraining is, in case the subsoil is very tenacious, the drains should not be less than three feet deep, perhaps three and a half would be better, and at such distances that the water shall find easy access to the drains; for so sure as the roots of pear-trees come in contact with stagnant water, just so sure it is death to the tree. A safe rule would be to make a few excavations in different parts of the field, to the depth of three and a half feet after underdraining and before transplanting. Carefully notice the rise and fall of water in the pits after heavy rains; and in case the water leaves the pits in a day or so, we conclude that pears may be put out with safety.

Regarding aspect, various views are entertained; many prefer a northern exposure, believing that they avoid the danger of late or spring frosts injuring the blossoms; others choose a southern or south-western exposure. Our own opinion is, as far north as Worcester County, the field should have a southern slope, and protected from the north and north-west winds by buildings, or other trees. To shelter an orchard from prevailing winds, is often of more consequence than the aspect; for pear-trees, when laden with fruit, will suffer more from heavy

storms of wind than from late frosts. Hence, if no natural protection exists it is well to plant evergreens that are of rapid growth, such as pines, or Norway spruce, to guard that part of the orchard where protection is most needed. Perhaps a more economical way would be to transplant three rows of peach-trees, the first row the same year the pears are put out, the others a year or two afterward. As peach-trees are comparatively short-lived, after the first row has done its work, new ones might take their places, and thus a new row transplanted as often as needed; thus always giving protection to the pear orchard by peach-trees that would always pay the expense.

Varieties.—Is is well known to those even who have had only small experience, that the pear is capricious; this year it *will*, next, it *won't*, the same variety in the same soil. That a Flemish Beauty or a Seckel will be produced to perfection in one soil, while a mile distant, and in one of precisely similar appearance, they fail to be anything more than second rate, is a mystery that has puzzled those of large experience, and even mocked all investigation.

The same may be said, in some respects, in regard to the apple. The writer says he can't grow the Rhode Island Greening on his soil, while just across the valley, at a distance of three miles, in soil apparently similar, it is grown almost to perfection.

In case we intend to grow pears for profit, it is unwise to make it a point to grow ninety-nine varieties; as that practice has already, in many cases, proved a failure. Hence, decide in the first place the kinds best adapted to your soil, if possible. A member of this committee having tried a few varieties, and succeeded so well in growing both wood and fruit, has come to the conclusion that the kinds adapted to his soil are the Bartlett and Seckel, as standards, which should be set eighteen feet apart, and a Duchesse between. In another locality, however, perhaps in the same neighborhood, the Belle Lucrative and Beurre d'Anjou, or the Lawrence and Sheldon, as standards, and the Bonne de Jersey might excel the Duchesse.

Now, to remedy the evil of being at so much expense in planting trees, and in a few years being obliged to re-set with other varieties, a farmers' club should be formed in every town, and

each farmer who intends to grow pears set one or more of each kind of the different varieties, and notice the result, discuss the subject freely in regard to soils, varieties, locations, &c., and report the same to the meetings of the club, and also to the county societies. This would, in a few years, enable parties to make better selection of fruit, and much uncertainty that now exists would be avoided; and in this way, too, it would be ascertained, to some extent, at least, the kinds best adapted to particular soils and localities.

Ploughing and Cropping.—To succeed in growing pears, deep and thorough ploughing is of vital importance. Two years before transplanting, the field should be ploughed at least an inch deeper than at any former ploughing, and the subsoil plough should follow in the same furrow, as deep as circumstances will permit, and the field be supplied with a liberal dressing of barn manure, and cultivated with some hoed crop. The succeeding year the field should again be ploughed as before, that is one inch deeper, and subsoiled as deep as practicable. By this operation, we deepen the soil some two inches; the field again being dressed with a supply of good yard manure thoroughly incorporated in the soil. The mode of ploughing is expensive, we are aware, but labor is saved in the end, as it supersedes the necessity of digging holes for the trees, at the expense of about $60 per acre.

From our own personal observation, we are satisfied, that with nothing short of deep ploughing and a thorough pulverization of the soils, will the planter meet with success. The old adage is, "work once well done is twice done," and so, the field properly worked is not prepared only for one or two years, but for a lifetime. Now, if the soil can be loosened to the depth of eighteen or twenty inches or more, and we think in the majority of cases it may be, it should by all means be done; for, a hole dug in the earth, especially where the soil is of close texture, is a cistern; this being filled with fine loam, or compost, retains the water, and when it becomes stagnant, it has an injurious effect upon the roots. Hence the tree becomes less and less valuable, until it is the cause of absolute injury. If the hole is deeper than the rest of the field is loosened, the lower part of it will retain the water, and cause an unhealthy action upon the roots in it;

but if the earth is loosened over the whole field as low as the bottom of the hole, the stagnant water will flow off.

Selection of Trees.—In selecting trees for transplanting, an eye should be had to the diameter of the tree, instead of the height. Choose those that have made their last years growth *stocky*, without regard to height; yet when a nursery-man, or tree-peddler is making his yearly visits in taking orders, when inquired of in regard to size, he will at once speak of their great height, which, in our estimation, instead of being a very good recommendation, is a very weak one, and should not be regarded a safe rule by the planter. Trees of stocky growth, and well supplied with good roots, are of more consequence than long, slender stems, even with good heads.

Manuring and Mulching.—Says Mr. Quinn: "There is no part of the work of pear-growing so little understood as that of furnishing the proper kind of manure, and in the right direction. Young pear-trees are often killed by over kindness in placing large quantities of coarse, strong, unfermented manure in the holes at the time of planting, and around the bodies of the trees. It should be distinctly understood that both of these practices are likely to be an injury to the welfare of young trees. It is admitted that unfermented manure of any kind should not come in contact with a young tree."

Says Mr. Barry: "Every garden should have its manure heap in such condition that in the fall, or spring, when it comes to be used, it will cut like *paste*. In that state only it is safe to apply it. All parts of it then are thoroughly decomposed; all seeds of noxious weeds are then dead, and it is in condition capable of yielding at once to the roots of growing plants healthy nutrition that will produce a *vigorous, sound and fruitful growth*, and this is precisely what is wanted; far better to have a young tree starved and stunted, than forced into a rank and plethoric growth with crude, ill-prepared manure. We presume that what the pomologists would be understood to mean in this connection in regard to green, unfermented manure is, that it should not be used in the holes at the time of planting. After this time we see no reason why green or unfermented manure may not be liberally spread broadcast on the surface. For the

roots of young trees are not nourished by *eating* manure, but by *drinking in* of the liquid after being filtered through the soil. We are of the opinion that the liquid portion of manure, after being drained through the soils, be it ever so green and unfermented, is in fit condition to be used as plant food."

Mr. Poor, of Somerville, says: "After twenty years' experience in growing pears, I am satisfied that any reasonable amount of manure will not prove injurious to pear-trees three or four years old."

Pruning Trees.—Mr. Downing recommends fall and winter pruning for fruit trees, without regard to kind. Although this may be regarded as high authority, yet our experience and observation controvert this theory. It has of late come under our observation in regard to the pear, as well as the apple, that a wound made in winter causes the limb to check, and usually "*dies down*" for some distance, thus producing a cavity between the wood and bark, and requiring a new cut to be made in April, or as soon as the sap begins to ascend; instead of a cavity being formed between the bark and wood, there is a protuberance or bulging out of new wood, forming a ring between the bark and wood. A layer of gum-shellac, or thick paint, applied at the time the cut is made, serves to prevent checking, and hastens the growth or protuberance of new wood.

EPHRAIM GRAHAM, *Chairman.*

HOUSATONIC.

From the Report of the Committee.

Only four entries of apple orchards, and three of pears, were submitted for their examination by the sixteen hundred or more members of the Housatonic Agricultural Society. There should have been a much larger number. The apathy among our farmers, in relation to fruit raising, is certainly quite inexplicable. It would seem that every man who owns even a small patch of ground, should devote as much as possible of it to the cultivation of fruit of some kind; but if we visit every town in the county, we shall find only here and there one actively engaged in the cultivation of fruit; especially the apple, which may well be denominated the standard fruit for this section of country.

If your committee can offer any suggestions which shall lead to the more diligent and successful cultivation of the apple and the pear, they would consider that they had done a good work. It has been well said, that he who plants a tree of any kind, particularly a fruit tree, not only benefits himself, but also confers a lasting favor upon those who come after him.

But he who plants an apple orchard in particular, undertakes a work in which not only himself, but the whole community are interested. The apple is truly a cosmopolitan fruit. It is eagerly sought for at all seasons, and in all places. No other fruit can be served in such a variety of forms; none satisfies the taste of all classes so well as the apple in its perfection. It has been well denominated the "democratic fruit." The question may be asked, Can we cultivate it successfully? We believe it may be. But there are certain conditions to be observed, and which are indispensable to success. The time has passed when it was only necessary to plant out a fruit tree, without much regard to the manner in which it was done to insure its successful growth. This could be done, perhaps, when the country was new, and before those elements which favor the growth of the apple were exhausted from the soil. But now it is not enough to plant a tree, and leave it to the mercy of the elements, or the animals that roam over the fields.

Probably, at the present time, the chief causes of failure are, the want of a proper preparation of the soil, of the selection of trees, and the mode of setting. One great reason why we have so few thrifty apple orchards seems to be, that they have been located in positions which the owner considered unfit for anything else but an orchard; such as old worn-out pasture, or some out-of-the-way place, where they wouldn't trouble anybody, or anybody trouble them.

Now it is just as necessary to prepare the soil for an apple or pear orchard, as for any other kind of crop. By thorough ploughing and manuring, and underdraining, if necessary, the soil should be made as loose and pliable as possible. An orchard should never be set in a soil which will retain water for any great length of time, because, although trees set in such a soil may flourish for a time, yet eventually they are certain to fail. A plentiful supply of manure must also be furnished; generally

that which has been composted is best, such as muck, forest leaves, ashes, lime, &c.

The matter of setting, too, is one of primary importance, and to which not enough attention is generally paid. When a proper place (not a hole in the ground) has been prepared, the tree should be set as nearly in the same position, and at about the same depth as it stood in the nursery. A place should be dug so large that in setting the tree none of the roots shall be crowded or twisted, and so deep that it may be filled up to the height at which it should stand, with the best surface soil mixed with a small quantity of finely composted manure. But the most important matter of all, and on which success primarily depends, is the selection of trees. It is a sad sight to contemplate many of the trees, dwarfed and stunted in their growth, which pedlars and agents have palmed off for No. 1 trees, upon the inexperienced and unsuspecting. Not a tree should be set in an apple or pear orchard which does not exhibit unmistakable signs of thriftiness and vitality. The safest and best way is to go yourself, if possible, to the nursery, and select such trees as you desire; although you may have to pay an extra price for them, you will be a great gainer in the end.

Every tree, when planted, should be fastened to a substantial stake (two would be better), which will prevent the wind from swaying its top, and so loosening the roots, thereby seriously retarding its growth, and in many cases destroying it entirely; and this should be continued until the tree is firmly rooted and able to stand of itself. The truth is, that although it is considerable trouble to set the stakes, and keep the trees fastened to them, yet, whoever takes that trouble, gains most surely one, if not two years' growth to his trees, especially if they are so located as to be exposed to any prevailing wind; a consideration not to be overlooked, whenever an orchard is to be planted out. Then, after the trees have been properly set, they must not be left to take care of themselves, as is generally the case, but should receive the most careful attention.

The same attention which is given to the raising of any crop on the farm, is required in the cultivation of apples or pears. They should receive the same care and labor that we bestow on a crop of corn or potatoes. The land should be manured and cultivated every year, with some crop which will not exhaust

the soil, and the soil around the trees kept light and loose by mulching; the trees themselves frequently and carefully examined, so that they may not be injured or destroyed by the numerous pests which, at certain seasons, will be likely to trouble them.

Mr. Wm. Burghardt, to whom we have awarded the first premium on apple orchards, washes his two hundred trees *twice* during the season, with soap-suds and carbolic acid, by which he keeps them free from insects of all kinds; and your committee venture to say, that a more thrifty and promising young orchard cannot be found within the limits of our county.

Thus far in our report we have spoken mainly of the apple; we propose to add a few words in regard to the cultivation of the pear. For a few years past the pear has seemed to be a more reliable fruit than the apple; not so liable to attacks from destructive insects, more regular in bearing, and therefore worthy of special attention; yet we find very few farmers who are planting out pears, so far as we have observed, notwithstanding all are ready to acknowledge, that in its perfection the pear is scarcely surpassed by any other fruit.

The same general directions which apply to the transplanting of the apple, apply to the pear as well; the same thorough preparation of the soil, and care of trees after setting. There is scarcely a farmer among us who cannot devote as much as a quarter or half an acre to the culture of the pear, and so have seventy-five or a hundred trees, as a source not only of enjoyment, but of profit also. We do not incline to adopt the well-known couplet that

> "He who plants pears,
> Plants for his heirs."

We would change it, in view of recent observation and experience, so as to read,—

> "He who plants pears,
> Plants for *himself* and his heirs;"

for we are satisfied that a good, thrifty, standard pear-tree, well planted out and properly cared for, will bear quite abundantly in from three to five years. In our soil the pear needs and will bear *high cultivation;* and after it once commences bearing, will continue to bear with great uniformity for a long period;

in many cases for fifty years, and some are known to have borne for a hundred or more.

Your committee are so deeply impressed with the value of good fruit, not only to individuals, but to the community at large, that they would venture to urge upon all who have the facilities, a close attention to its cultivation. Good fruit of whatever kind will always find a ready market, and bring a remunerative price; so that he who engages intelligently in its cultivation need have no fears as to the result, whether his object be health, pleasure or profit.

M. WARNER, *Chairman.*

MARTHA'S VINEYARD.

From the Report of the Committee.

Orchards, properly includes *orcharding*, or the planting and cultivation of orchards. Treating the matter in this general way, the committee would premise that the thoughts they have to express are not wholly the results of their own personal observations, although they are partly so; but they are in a great measure gathered from the declared and authentically reported experiences of some of the greatest and best pomologists in the country. And if one can have the undoubted practical results of experience, which amount to actual knowledge on the part of the experimenters, it is incomparably better than all mere theories, however finely gilded.

It is thought by many that orcharding in New England cannot be carried on as easily and with as good success now as in the early years of the settlement of the country, when the clearings were comparatively small, and the forests extensive. It is held that the latter then afforded shelter to the fruit trees, of which protection there is now in many places, especially on the sea-coast, a great lack; thus exposing the trees to the salt spray or mist from the ocean in times of high south-westerly winds. This condition of things, it is believed, has not only had a damaging effect upon the fruit crops, but also on the lives of the trees themselves. And this is unquestionably true of the peach, whatever may have been the degree of injury to other trees of the orchard. It is said that in those early years fruit

trees were long-lived, and that fruit was very abundant; but that now it is otherwise.

If these statements be admitted as reliable to any considerable extent, what then is to be done? Are we to give up orcharding, and do without the useful and delicious fruits altogether? Or shall we not rather seek, by reading, experimenting and every other available means, so to store our minds with knowledge as to enable us to do *what we can* under the circumstances to secure a competent supply. So men are doing in the central and other parts of the State, insomuch that fruit has already become one of the most remunerative crops in the Commonwealth.

Mr. Moore, of Concord, himself a very large fruit grower, said at the meeting of the State Board of Agriculture, in Framingham, last autumn, that in 1864 the value of the apples and pears only, which were all the kinds of fruit named in the State returns of that year, was $1,713,240. He estimated the value of all other kinds of fruit at $500,000; making a total value for that year of $2,213,240. He adds that that year was a poor one for fruit, yet the farmers of that year gathered but three crops which exceeded that of fruit, viz., those of hay, corn and potatoes. He thought that in another decade, with a good crop of fruit, the returns of the State would show fruit second only in value to that of hay. And Mr. Marshall P. Wilder, the great horticulturist of the State, was of the same opinion, but thought the method of cultivation in Massachusetts is to be different in the future from what it has been in the past.

With all her disadvantages, such are the enterprise and energy of her people that Massachusetts is now rated about the second or third fruit-growing State in the Union. While this is the case shall we, although thus exposed to the sea mist,—shall we on the island of Martha's Vineyard,—be discouraged and not keep up our good name among our sister counties? While great improvements in this line have been going on in the State, especially within the last twenty-five or thirty years, we have done something, it is true, but we can and ought, with our facilities, to do very much more. We have obstacles to overcome, and enemies to combat; so have others the same. A few citizens are doing well; the masses do not do enough. Those who have lands in abundance, as many have, and the ready

means of fertilizing them, could grow large quantities of fruit, and in rich varieties. It will pay. We have a ready and extensive market for early fruit, growing up in our very midst. And besides the idea of sales, good fruit is so promotive of health that we should not, as one has well suggested, have fruit for our own use in stinted quantities, as though it were such a luxury that we could illy afford to partake of it; but we should eat of it freely—place it upon our tables as a wholesome and ordinary diet.

But it may be alleged that to raise fruit will require much labor, and we have so much to do on our farms that we cannot spare the time for this. Why not for this as well as for other things, if, as we have seen, this can be made as remunerative as almost any other kind of farm produce ; and if, besides our sales, we and our families can enjoy to satiety the precious products ?

It is well and truly said, in one of the late reports of the Commissioner of Agriculture, printed in Washington, that "no one should attempt to raise an orchard until he is ready to give his trees such care as is requisite for the production of a crop of corn or potatoes, as the apple-tree must have care in all its stages, from the seed to the mature tree."

From what was said as to the shortening of the lives of fruit trees, it is apparent that it has become a necessity not only to do what we can to reinvigorate old trees, but oftener than formerly to set out young ones and form *new orchards*. And it seems to your committee that in doing this it is wisdom in every farmer to make his own nursery, to plant his own seeds, and to do his own grafting and transplanting. For besides the saving in money, it is said that apple-trees grown near the spot where they are to be set out, are worth more than those brought from a distance, which have in most cases but a small supply of roots, and those very likely so long from the native bed that they have nearly or quite dried up, so that the life of them is fast becoming extinct. And this remark applies to other species of fruit trees as well as to the apple. But if we buy any from abroad, we should *watch against imposition*. Dollars in no stinted numbers have been thrown away, or rather paid for what proved to be worthless. We should secure trees with good roots, a plenty of

them, and of *good length;* and, as far as possible, trees that have been newly taken from the ground.

Having obtained our supplies from the nurseries, our own or others, the spot in which to locate them should be selected with care and judgment. It is held by those who should know, that a young orchard should not be set on the site of an old one, from which worthless apples have been taken; and that no kind of fruit trees should succeed the same sort. But the apple may be set where pears and grapes have been grown, and so *vice versa.* Rotation may be as essential in fruit as in any other crop. As to the nature of the soil, it is said that loamy land suits the apple, but in setting out young trees we must be sure to dig the holes deep enough to go below the clay pan, so that the roots can extend downward. They will not do as well where they are kept above the hard clay. By thus digging through we can drain the top soil of the undue amount of wet which otherwise often exists there, to the injury of the trees.

It will be all the more favorable for the young trees to get a good start, if the ground has been well dressed and prepared the year before setting out. Labor, pains and skill should not be spared in the setting of the trees; then manure the grounds bountifully every year, especially while the trees are young. Wood ashes are good, put near them. Home-made superphosphate is recommended as an excellent manure for pears.

We are counselled by experienced fruit growers to remove old orchards and plant new ones, because the old harbor insects.

Having planted an orchard, it is maintained that special care should be taken, particularly in loamy land, to keep out grass. This is regarded as one of the greatest enemies, especially in such ground. It is the opinion of some that orchards, particularly while young, should be kept under constant cultivation. Insects and mice, we all know, must be combated. To keep off the latter enemy, the dressing around the trees for winter must be old and free from straw. As relates to the canker-worms, it is remarked that they "remain but few years, and can be successfully fought."

In the matter of grafting, the Williams apple and the Gravenstein were recommended at the country meeting of the State Board of Agriculture, last autumn, as the best to graft into old

trees for early fruit. With regard to pears, the Duchesse d'Angouleme was preferred in one of the reports as the best dwarf pear—made better by grafting into a quince stock.

Pears are a luscious fruit, and orchards of them should be grown here as elsewhere; but the more approved kinds are not well suited, with us, for culinary purposes. Pear-trees need much more attention than the apple.

In the report of the Commissioner of Agriculture, for the year 1869, we have the following:—

"Remarks on Pear Culture.—The value of the pear as a domestic fruit, is second only to that of the apple. For culinary purposes the latter is probably more highly esteemed, but for the dessert the pear is almost universally held as much superior. The pear-tree is hardy, and attains to a great age,—greater it is conceded, than the apple, notwithstanding the popular impression that it is subject to more casualties, and is not so enduring. History proves that the pear is of very ancient cultivation, although it has not been so largely or so generally planted as the apple. Various reasons may have influenced this discrimination, the most prominent of which are the greater care required in harvesting the crop, and the difficulty of keeping and ripening the fruit to its highest degree of perfection. Even at the present time the management of the finest winter varieties is far from being generally understood. The prevailing opinion that the tree is constitutionally tender, and more subject to diseases and casualties than other fruit trees, has undoubtedly exerted a strong influence against its extended culture; but however much these reasons may have gained credence in the past, they have now lost their efficacy, and many extensive pear orchards have been planted during the past fifteen years, and their number is constantly increasing."

The first item dwelt upon under this head is "Sites and Shelter of Pear Orchards." The author says: "Low situations should be avoided on account of the greater extremes of temperature prevalent in valleys than in places of moderate elevation, and the consequent probability of injury from late spring and early winter frosts. A sloping hillside, contiguous to a well defined valley, forms the choicest orchard site, not only for

pears, but for other fruits as well." With us it should be an *eastern* hillside. The "shelter" best suited is not surrounding hills, for the reasons given above; but buildings and shelter trees. The editor thinks that "evergreen trees afford the most perfect shelter in the least space." With regard to "soil," he remarks that "the pear will exist in a variety of soils, but attains greatest perfection in clayey loam." Soil should be prepared for setting by deep tillage, and the holes should be dug deep for the same reasons as for the apple graft in similar soil, elsewhere noted. A brief statement of the other general directions seems to be, plant carefully, mulch wisely and prune sparingly.

Quinces are well adapted to our soil and climate, as the writer of this has said in a former paper; and peaches, although the tree is short-lived, can be grown, and they certainly contribute an agreeable variety for the palate. But the apple is the kind of fruit for culinary uses, being the leading fruit of New England. And it has been held that as respects the flavor of this kind of fruit it is better in this State than is that of the Maine apples on the one hand, or of those of the West on the other. The Western apple is larger, but not of so good flavor as ours. It is when the apple is in the perfectly ripe state that it has the most sugar. It is then healthful for all, even for the domestic animals; and the best for *them raw*. But when rotted, it is not fit to eat; it is only fit for the compost heap.

Mr. J. F. C. Hyde, of Newton, one of the best authorities, holds that "the raising of apples is one of the most profitable branches of farming to-day." He adds, "With the exception of market gardening and the raising of small fruits about the cities, I believe it is as profitable a branch of farming as any one can engage in." He further says, "You can just as well grow apples as oak-trees."

No entries of orchards for premiums have been made to the secretary this year, therefore the committee have no sums to award. This is regretted, because it is known that there are some excellent orchards in the county, although the committee learn that generally the show of fruit the present year is not as good as an average.

HEBRON VINCENT, *Chairman.*

FOREST TREES.

WORCESTER WEST.

From the Report of the Committee.

A reference to the remarks which accompany the offer of premiums which your committee were to award (if there had been any competitors), shows, that the trustees of the society were willing to shift from themselves the responsibility of an implied belief in the importance of forest culture for the interest of agriculture, to the shoulders of the legislature; and the curious may find, by reference to the margin of the statute book, chap. 66, sect. 8, in what year it was that the assembled wisdom of the Commonwealth essayed to encourage the raising and preserving of oaks and forest trees, "to perpetuate within the State an adequate supply of ship timber." But the era of ship building as a profitable branch of industry in Massachusetts has passed away before the supply of ship timber by any means has failed, and it may not be unwise to modify that statute so as to provide that "such premiums may be offered as shall tend to preserve the beauty of our scenery, the fertility of our soil and the salubrity of our climate," and let the ship building follow the great law of supply and demand.

Let a son of Massachusetts be placed on the boundless prairies of the West, where, far as the eye can reach, no sight of timber relieves the uniformity of the view, and he will learn how much of the beauty of New England is owing to her forest trees. Ride through a section of country broken and uneven, where the demands of business and a carelessness of the future have caused the stripping off from the hills of the forests which covered them, and you may see how possible it is for man to make ugly and repulsive that which God and Nature have made beautiful and attractive.

Those of us who heard the distinguished delegate of the Board of Agriculture—whose presence with us added so much to the enjoyment of the occasion, and whose enthusiasm of manner, elegance of expression and extent of research, have rendered the science of agriculture his debtor, and the farmers everywhere his friends, as he discoursed upon the crops in Essex in other

days, and showed how far they exceeded those of the present era in Massachusetts, and how the farmers of Massachusetts were prompt to avail themselves of the circumstances in which they were placed, and connected with his remarks the fact that population had crowded into the eastern part of the State, and cities and large towns have created a demand that has cut off very largely the forests of that section,—may see why it is that the fields and the mowing lands yield less to the acre with all the fertilizers that can be applied than they did in years gone by. And if, to the picture presented to us by the Ex-Consul General to Egypt, of the condition of agriculture in that land, and of the round of "pumping and kicking," and "kicking and pumping," with which the inhabitants supplied the land with the moisture it needed, we add the fact that formerly the banks of the Nile were covered with forest trees, and that the cutting down of all these promoters of rain and preservers of moisture is believed to have been the cause of the excessive barrenness of the soil, and the consequent decline in civilization of the people,—so that now the pasha is causing tracts of country to be planted with forest trees, that he may restore to his kingdom the glory of other days, when it supplied corn for the famishing nations of the world,—we may learn something of the value of forest trees to the productiveness of the soil. And in the town of Truro, on the extreme end of Cape Cod, and at the island of Martha's Vineyard, may be found examples where the existing state of things, contrasted with the undoubted traditions of the not distant past, confirm the correctness of the idea that the distribution of the land into forests and cultivated fields is essential to the highest fertility of the fields. Nor need we go to Essex or to the Cape, to Egypt or any foreign land. Why is it that our springs are drying up, and wells that have furnished water for man and beast, as long as the memory of man, runneth back upon their supply? The law of vegetation, of evaporation of moisture, and concentration of the productive elements of earth and air in the snow and the rain, is as unchangeable as the laws that govern the moral creation of God, and the farmer, as well as the mechanic or the philosopher, does well to study these laws if he would evade the penalty of their violation.

That the influence of forest trees is not less important to the

health and life of man than to the salubrity of the climate and the fertility of the soil, I doubt not can be demonstrated. The principle of compensation pervades all nature, and the earth in all its parts is adapted to the wants and needs of man. So, though I may not be able to show how the presence and growth of forest trees absorb from decaying vegetable matter those properties which, diffused in gases in the atmosphere, would breed typhus and other types of malignant fevers, and causes them to contribute the phosphorus and the potash essential to the growth of the trees, or how the shelter and protection of the thickly growing wood from the fury of the winter's wind may save the population from consumption's stealthy approach, or the shaking up of fever and ague, yet who can doubt that such is the fact?

And to conclude, it is with the belief that the farmers of Worcester West would not only increase the beauty and attractiveness of their section of the Commonwealth, preserve its desirableness as an abiding place for the rewards the ground shall repay for labor, and the comfort and health which its perennial springs and running streams shall bear to its population, but also find individually and collectively a source of present profit, that we commend to their attention what in the oldest and best educated nation in Modern Europe has a professorship in its universities,—the best methods for the cultivation and management of forest trees.

EDWIN WOODS, *Chairman.*

FRUITS.

ESSEX.

Statement of B. F. Huntington, of Amesbury.

STRAWBERRIES.—The crop of strawberries which I present for premium was raised on thirty-two rods of land, which was formerly an old onion bed, and had been manured for the crop with stable manure. No manure was used for the strawberries except leached ashes. The plants were set in the spring of 1870.

Sold 1,425 boxes, at an average price of 24$\frac{6}{7}$ cts.,		$355 72
4,000 plants, 50 cts. per hundred,		20 00
Sales,		$375 72

Expense of cultivation:—

50 bushels ashes,	$10 00	
11 days' work setting plants, weeding, etc.,	16 50	
Team,	1 50	
Picking and packing,	42 75	
Marketing,	10 00	
Plants,	10 00	
Interest and taxes on land,	6 00	
Total expense,		96 75
Balance in favor of crop,		$278 97

The above crop, viz., 1,425 boxes on thirty-two rods, equals 7,120 boxes per acre, which, at the price received, would amount to a product of $1,787.36 per acre.

The variety was the Wilson's Albany, which I have cultivated for ten years. I have also raised many other fancy sorts, as the Triomphe de Gand, Russell's, Jucunda, Agriculturist, etc., and have discarded all for the Wilson's, as that strawberry brings as much in our market as a better one does, and bears more than double any other variety that I ever tried. The plants were set in the spring, about the first of May, in two rows, two feet apart each way, then leaving a space of three feet, then two rows more, and so on, allowing the plants to run into the three-feet space, and then the next spring taking them out for plants to set or sell, and in so doing leaving a path between each bed, which makes it convenient for picking.

The runners were trimmed twice at the first of the season and allowed to grow the rest of the season, though in this I think I made a mistake; this year I allowed the *first* runners to grow, thus securing *stronger plants* for next year's bearing, and trimmed the later runners. It is my opinion that we get more and better fruit in this way than in strictly hill culture, as in hill culture I have sometimes had three hundred berries on a single nt, almost always two hundred to two hundred and fifty, and

the plant is not strong enough to carry out so many berries to a suitable size. In regard to mulching and covering, I use pine leaves (tassels) from the forests, the cost of which is the labor of collecting them, which, in my statement, is put in with the cost of labor.

This year I shall put the pine leaves on them, some salt grass on top; for the past two winters have been hard for the plants, unless well protected. I take about one-half the leaves off in spring, leaving the rest on as mulching, which serves a good purpose in keeping down weeds, and keeps the fruit clean, though making the crop three or four days later in ripening.

When Mr. Robinson states the cost of picking and packing is less than three cents per box, I think he makes a mistake. If I remember aright, in my statement it is just three cents per box: one thousand four hundred and twenty-five boxes, at three cents, makes $42.75; though this season it cost me less for picking than some other seasons, owing to size and thickness of the berries. A hand could pick seventy-five boxes per day on an average, making, at two and one-half cents per box, $1.87 per day; and I have had a hand pick one hundred boxes per day in the best picking. My own folks did the packing, which I estimated at one half cent per box. One hand, by working all day, could pack two hundred boxes, making one dollar; though in former seasons when I have hired, I have paid more than that,—about one cent per box. I think the subsoil is a moist loam, with the soil not over ten inches deep. The general price paid for picking in this place is three cents per box.

WORCESTER NORTH-WEST.

From the Report of the Committee.

Pears, of the choicer varieties, are among the finest fruits of our climate. In this latitude, with sterile soil around us, we cannot recommend their culture, extensively, for the market, but every person owning a patch of land should raise a few for home use. As a rule, the hardier varieties should be selected for this region; in favorable aspects those more tender may succeed well.

Among the summer varieties, the Rostiezer is a general favorite; it is hardy and productive; its fruit resembles, but is not

quite equal to the Seckel. The Beurre Giffard is well spoken of; it requires high culture. The Doyenne d'Ete is said to be the earliest summer pear. Osband's Summer is well recommended. The Tyson is very late in coming into bearing; the Bloodgood somewhat so. Of early autumn pears, the Bartlett outranks all others; not because it is better, or even equal, in quality to some others, but more on account of its being the best-known pear raised; it is reliable and good; but the Belle Lucrative is better, though, not being generally known, it does not bring half as much in market. One writer considers it "second to none in vigor of growth, productiveness and quality of fruit"; another describes it as "very hardy, productive and rich; succeeds with common culture." The Andrews is excellent, but the tree, so far as I know, shows signs of early decay in this vicinity. The Louise Bonne de Jersey has been very popular, and perhaps deserves to be so still on account of its productiveness; it is generally regarded now as a second-rate pear. It is spoken of as follows by a gentleman residing in Western New York, a little further north than we are: "I grow over forty varieties, and regard the Louise Bonne de Jersey as the very best for canning. It is handsomely shaped, so it looks nicely when canned; it is just tart enough to give a fine flavor to the canned fruit; the tree is very healthy and hardy, bearing abundant crops at the West and North."

At the head of late autumn varieties, with regard to quality, we put, unhesitatingly, the Flemish Beauty and the Seckel; but the former will crack; nevertheless, if the cracked fruit be early picked off, the crop will probably be quite satisfactory. The Seckel is a tardy bearer, and requires very rich soil; the fruit is small, but the quality is unquestionable. Swan's Orange is a hardy variety, large, handsome fruit, and fair quality; in some places it rots badly at the core. Beurre d'Anjou, a late fall, or early winter variety, is deservedly gaining in popularity. It produces regularly, large, good fruit, somewhat tart. With a good word for the Duchesse d'Angouleme, we pass on to notice a few winter varieties.

The Winter Nelis is a pear of fine quality, but the tree is not as hardy as the Lawrence, which is probably better adapted to our climate. Unlike the Bartlett, and many other varieties, the Lawrence often remains in good condition to be eaten for several

weeks. The Vicar of Winkfield is to be recommended principally on account of its hardiness and productiveness. It is not "first rate," and, unless well ripened, is often quite poor. "It might be set down," says Quinn, as good, bad or indifferent. It is, however, one of our best cooking pears." The Glout Morceau, very popular a few years ago, is now generally denounced as a worthless variety.

By a judicious selection of varieties and faithful culture, almost any one can raise good pears enough to supply his table well, six or eight months in the year.

Certain varieties do decidedly best on quince stock, such as the Duchesse d'Angouleme, Louise Bonne de Jersey, Easter Beurre, Beurre Diel, Glout Morceau and Vicar of Winkfield. But the Bartlett, Doyenne d'Ete, Flemish Beauty, Winter Nelis, and others, do best as standards. The dwarf is not in general favor, except for certain varieties, the Duchesse d'Angouleme in particular, which has not usually done well as a standard; the standard Duchesse, it is said, produces inferior fruit and less of it. Some recommend setting standards and dwarfs together; the standards as near each other as they should be when in bearing condition, and a dwarf between them. The dwarf will do its work and get out of the way by the time the standard begins to bear much. A good distance for standards in the orchard is 12 by 16; in the garden they may be a little nearer.

In selecting dwarfs be particular to get those that were budded low; for in planting them it is important that the place of union between the pear and quince should be several inches below the surface. Set in this way, dwarfs will ultimately become standards, by throwing out roots from the pear stock.

In some places a northern exposure is preferred in order to avoid the danger of late spring frosts. As far north as this, however, too warm an aspect cannot probably be selected, especially on high ground but little subject to late frosts. When practicable, places protected from winds should be selected. A rapidly-growing evergreen hedge, in the absence of natural protection, does very well. Hedges of vigorous varieties of pears have been planted for this purpose, which not only screen the orchard, but bear good crops of fruit.

It should always be borne in mind that the pear-tree needs a rich soil and high culture; but it will not bear unfermented

manure applied to its roots. The ground should be made rich enough to produce large crops of corn, before planting the tree, and kept so by an annual top-dressing of thoroughly decomposed manure carefully worked into the surface soil with a rake or hoe.

Liquid manure is excellent, if well diluted and applied in the early part of the season. A moderate dose, once a week, till August, will be as much as is well to administer. Growth of wood should not be encouraged late in the summer, for it will be too tender to stand our severe winters

Trees should always be mulched, especially in the hot season, to filter the rains, keep the surface open and moist, and retain the escaping gases. A good mulch is, in results, equal to a dressing of manure. Let no one plant more trees than he can tend well; otherwise results will be most discouraging, and pear culture abandoned. The practice of raising grass in the pear orchard, or any other crop after the trees come into bearing, will very much diminish the quantity of fruit and injure its quality. Clean culture is the only method that will give satisfactory results. Stir the ground occasionally to the depth of two or three inches to keep down all weeds and leave the surface loose. Keeping trees mulched will be a partial substitute for this.

The bark of a tree should be kept clean by washing in the spring before the leaves appear. One good wash recommended, is a pound of caustic potash dissolved in a gallon of water. This will drive away insects and promote the healthfulness and growth of the tree. The growth is also promoted by early spring pruning before the sap begins to circulate. If pruned in the winter, the cold weather is likely to injure the ends of the branches, and kill the leaf-buds thereon. If fruit, instead of wood, is desired, pruning should be done during the growing season, but late enough to prevent a second growth. The latter part of July, in our climate, would probably be a good time to prune for this purpose. Bending young shoots into the form of rings has been successfully practised to change the habit of trees from wood-making to fruit-making.

But usually it is not well to urge trees into early bearing, or to allow them to bear heavily after they do begin. No tree should ever be allowed to produce enough to endanger the breaking

down of its unsupported limbs. Thin out the fruit, and make the branches stocky by cutting back, so that no supports will be needed. By thinning, larger, fairer and more luscious fruit will be produced, and the tree kept in thrifty bearing condition; so that, for a term of years, the quantity will be increased as well as quality improved by not permitting the tree to be overworked. The importance of picking off a portion of the fruit when trees are inclined to overbear, cannot be too strongly emphasized.

Whoever proposes to plant a grape-vine in the northern part of Worcester County, had better select an early variety; for moderately good grapes, well ripened, will be vastly more satisfactory and enjoyable than those of a much finer variety, frost-bitten. But, fortunately, we have many good grapes that will almost invariably get ripe in our climate. It is unwise for us to attempt to raise such as ripen as late as the Isabella and Catawba. The Concord will be found too late unless it has a very favorable position. The Delaware is more certain to ripen, and other varieties are still earlier.

The Eumelan has not been raised much in this region, but it is very early and very good, and succeeds well wherever it has been tried.

IRA BAILEY, *Chairman.*

HINGHAM.

Statement of Charles H. Dwelley.

The subscriber makes application for a premium for the most profitable plantation of strawberries, not less than one-quarter of an acre.

Amount of land, 45 rods; soil, gravelly loam.

PRODUCT.

920 boxes of strawberries, average price 28 cts. per box,	$257 60
4,000 plants, at $5 per 1,000,	20 00
	$277 60

COST.

4½ cords of barn manure, at $8 per cord, delivered,	$34 00
Ploughing,	9 00

Plants,	$4 00	
3 days setting out plants, at $2 per day,	6 00	
7 days hoeing, " " "	14 00	
4 days covering with hay and oak leaves,	8 00	
Half ton fresh hay for covering,	5 00	
Uncovering in spring, and protecting against frost, 2½ days,	5 00	
2½ days weeding after uncovering,	5 00	
3 days watering plants,	6 00	
Picking and marketing 920 boxes of strawberries, at nine cents per box,	82 80	
Marketing plants,	10 00	
		$188 80
Profit,		$88 80

In the foregoing statement the interest on land, manure and labor investment is not included. Neither is any account made of the manure left in the soil; probably it would be fair to offset one against the other. Neither is anything credited for vines left on the land, though they have a value, but not a great one.

The fruit was grown from plants set in the ground the first of May, 1870; plants set in rows, four feet apart, two feet apart in rows, and allowed to cover three-fourths of the ground. Varieties, Wilson and Cutter seedling.

CHAS H. DWELLEY.

Statement of Jedediah Dwelley.

The subscriber makes application for a premium for the most productive and most profitable plantation of strawberries, not less than one-eighth of an acre

Amount of land, 28 rods; soil, clayey loam.

PRODUCT.

790 boxes of strawberries, average price 28 cts. per box,	$220 20
1,000 plants, at $5.00,	5 00
	$225 20

COST.

2 cords of barn manure, at $8 per cord, delivered,	$24 00	
Phosphate of lime,	1 50	
Ploughing,	6 00	
Plants for setting,	2 00	
2 days setting out plants,	4 00	
5½ days hoeing,	11 00	
1 day covering,	2 00	
Half ton of hay,	5 00	
Uncovering in spring, and protecting against frost,	3 00	
1½ days weeding after uncovering,	3 00	
Picking and marketing 790 boxes, at 9 cts. per box,	71 10	
Marketing plants,	2 50	
		$135 10
Profit,		$90 10

In the foregoing statement, the interest on land, manure and labor investment is not included, nor is any reckoning made of the manure left in the soil, or of the vines left on the ground, though the value of the last two items must exceed the interest by several dollars; should say ten dollars would be a low figure. Varieties, Wilson's and Downer's.

The plants were set in the ground the first of May, 1870, and the fruit gathered in June and July of the present year. Commenced picking, June 12; ceased, July 6.

JEDEDIAH DWELLEY.

GRAIN CROPS.

ESSEX.

Statement of J. C. and R. Jaques, West Newbury.

INDIAN CORN.—The crop of Indian Corn which we have entered for premium grew on one acre of land. The soil is

light loam. The crop of 1870 was hay. It was ploughed in the fall, and the manure (five cords to the acre) was ploughed in, in the spring, about eight inches in depth. The land was marked off in rows three and one-half feet each way, and 300 pounds of Bradley's superphosphate put in the hills, and planted the 10th of May; cultivated each way twice, and hoed twice. The top stalks were cut about the first of September, and October 25th we commenced to cut and harvest, and finished October 30th. The amount of corn raised was eighty-four and one-half bushels, eighty pounds to the bushel. Top stalks, two tons; butt stalks, three tons. One bushel of eighty pounds of ears was shelled and ground November 4th; the shelled corn weighed sixty-six pounds.

EXPENSE OF CROP.

Cost of ploughing,	$9 00
Value of manure on the ground,	45 00
Cost of superphosphate,	9 00
of harrowing,	1 00
of seed and planting,	4 00
of cultivation,	7 50
of harvesting and storing,	18 00
	$93 50

VALUE OF CROP.

84½ bushels of corn,	$84 50	
Stover,	65 00	
Manure in the land for future crops,	22 50	
		172 00
Net income,		$78 50

From actual measurement I hereby certify that the above crop covered one acre of land and no more.

M. W. Bartlett.

Statement of J. C. and R. Jaques, West Newbury.

Rye.—The crop of Winter Rye which we have entered for premium grew upon one acre of land. The soil is light, slaty. The crop of 1870 was hay, about one-half ton to the acre. It

was ploughed in August, 1870. Three cords compost manure were spread upon it, and September 8th one bushel and one peck of rye were sowed and harrowed in. July 11th, 1871, it was cut and harvested; threshed and cleaned the middle of September. The amount of rye raised was thirty-six bushels and three pecks—56 pounds to the bushel. Straw, one and three-fourths tons.

EXPENSE OF CROP.

Cost of ploughing,	$3 00
Value of manure on the ground,	18 00
Cost of seed,	1 62
of sowing and harrowing,	2 50
of cutting and harvesting,	5 00
of threshing and cleaning,	5 00
	$35 12

VALUE OF CROP.

36 bushels rye,	$45 96	
1¾ ton straw,	38 50	
Manure in land for future use,	9 00	
		93 46
Net income,		$58 34

From actual measurement I hereby certify that the above crop covered one acre of land and no more.

M. W. Bartlett, *Surveyer.*

MIDDLESEX SOUTH.

Statement of John Johnson.

Indian Corn.—The crop of Indian Corn which I enter for premium was grown upon one acre of land. The value of the land is about seventy-five dollars per acre. The top soil is varied in quality—some portions being gravelly, some of a deep rich, dark soil, with just enough mixture of sand to make a good active, gritty soil, the whole being underlaid with a gravel subsoil. This acre field was planted in rows about twenty-seven rods in length, and three and one-half feet apart the longest way,

consequently requiring twenty-nine rows to complete the acre. This land was in grass from 1860 to 1870, and during that period no dressing was applied. In the spring of 1870 I ploughed nineteen twenty-ninths of the field, and manured with barnyard compost in the hill, and planted with potatoes; gave them good care, and received a good crop. The remaining ten twenty-ninths was in grass until the second day of May, 1871, when I ploughed it about seven inches deep, then rolled it with a one-horse wooden roller. I then applied equally upon the acre a dressing of compost, made by mixing the droppings of the cows during the winter with loam, &c., which were carted into the barnyard the season of 1870. The dressing applied to that portion of the land planted in 1870 was ploughed under to the depth of five inches, and harrowed; at the same time the dressing upon the remaining portion of the acre was worked into the soil as much as possible with a Bucklin harrow. I then passed a bush over the entire acre. May 13th, the rows were marked lengthwise, three feet six inches distant from each other, and about the same distance crosswise. The corn was planted the 15th day of May. The ground being very dry, the corn did not come up well. After hoeing the first time, I replanted the vacant hills; received but very little corn from those hills, and that was of little value, but received a great increase of stover, which was injurious to the crop of corn, in my judgment. Cultivated and hoed three times; the field was quite free from weeds during the season. The cost of harvesting was increased some in consequence of the corn having been blown down during a shower, in the early part of September, and the corn crop somewhat injured. The nineteen twenty-ninths of the field, which were planted to potatoes in 1870, produced much more corn, proportionately, than the ten twenty-ninths which remained unploughed until May, 1871. Thursday, Oct. 19th, cut and carted corn to the barn; finished husking it Monday, Oct. 23d.

EXPENSES OF CROP.

Ploughing, applying dressing and harrowing, . .	$14 25
Bushing, rolling, marking, ...	1 80
Seed, planting, crow line, ...	5 07
Cultivating, hoeing three times	9 75

Cutting stalks and harvesting,	$17 00
Fourteen cords manure, at $5 per cord, two-fifths this year,	28 00
	$75 87

The yield of corn was 6,134½ pounds, making 85⅕ bushels of 72 pounds each. The 72 pounds of ears gave 61⅛ pounds of shelled corn; and this, reduced to legal weight (56 pounds per bushel), makes a yield of 93 bushels of shelled corn to the acre.

VALUE OF CROP.

Ninety-three bushels of corn at $1.25,	$116 25
Three hundred and four bundles stalks,	9 02
Husks,	31 33
	$156 60
Deduct expense,	75 87
Net income,	$80 73

Deducting from the expenses of the corn crop, the value of the top stalks and husks, we have the cost of the corn.

Whole expense,		$75 87
Value of top stalks,	$9 02	
Value of husks,	31 33	
		40 35
Making 85⅕ bushels corn cost,		$35 52
Cost of one bushel, nearly		42

JOHN JOHNSON.

FRAMINGHAM, Oct. 31, 1871.

Statement of Josiah Gibbs.

INDIAN CORN.—The field of corn I enter for premium contains four acres; the soil is deep loam, the field was grass land, and was ploughed in 1869, and planted with corn in 1870, and had a good crop. In April, 1871, the land was manured with twenty-one cords green manure, spread on the land and ploughed

in. The 12th of May, the land was harrowed, and planted with corn, with Buckminster's patent planter. In October, one acre of the field was surveyed by Dexter Newton.

EXPENSES.—ACCOUNT OF ONE ACRE.

Five and a quarter cords of manure, one-half,	$18 38
Carting and spreading,	5 00
Ploughing and harrowing,	3 25
May 12th, planting,	52
" seed corn,	37½
June 6th, cultivating and hoeing,	2 50
" 21, 23, cultivating,	87½
" 18, 30, cultivating, hoeing,	2 50
August, hoeing up weeds,	2 00
" topping, picking stock,	2 50
October, D. Newton, surveying one acre,	1 50
" harvesting, &c.,	11 00
" Capt. Russell for help, harvesting and weighing,	3 00
Value of land, $50, interest and taxes,	3 50
Total expense, one acre,	$56 90

The field was planted with a corn planter drawn by a horse one way, 3½ feet apart, dropping corn two feet apart.

In cultivating this corn I value one man's labor $2 a day, and with a team $4 a day.

The yield on one acre surveyed was 75 bushels, 72 pounds to the bushel. The corn was thoroughly ripe.

Seventy-five bushels corn at $1.25,	$93 75
Two hundred and ten bundles stalks at three cents,	6 30
Husks,	15 00
	$115 05
	56 90
Profit,	$59 15

JOSIAH GIBBS.

Statement of S. M. Thomas.

INDIAN CORN.—The field of corn which I enter for premium contains one acre, and is valued at $50; the soil is a deep loam. The field was grass ground, ploughed about the middle of May, eight inches deep. The manure was put upon the land as it came from the barn-cellar, at the rate of ten cords to the acre, valued at eight dollars a cord, and thoroughly harrowed in. In order to get the full benefit of the manure, I think it should be ploughed in three inches deep.

Ploughing,	$4 00
Carting manure,	3 00
Spreading,	2 00
Harrowing,	4 00
Striking out,	1 50
One peck of seed corn,	25
Planting,	2 50
Plaster,	3 00
Cultivating three times,	4 80
Hoeing three times,	6 00
Weeding in August,	3 00
Cutting and stooking stalks,	3 00
Harvesting and husking,	9 00
Ten cords of manure at $8 per cord, one-half this year,	40 00
Interest and taxes,	4 35
	$90 40

The yield was 5,092 pounds, making $70\frac{5}{7}\frac{2}{2}$ bushels.

$70\frac{5}{7}\frac{2}{2}$ bushels corn at $1.10 per bushel,	$77 79
774 pounds stalks, at $1 per hundred,	7 74
Husks,	15 00
Income,	$100 53
Expenses,	90 40
Profit,	$10 13

SAMUEL M. THOMAS.

Statement of Josiah Gibbs.

Wheat.—The field of wheat I enter for premium contains half an acre; the soil is deep loam; the land was manured and planted last year, 1870, with corn and various garden plants. April, 1871, sowed one bushel wheat, Oswego wheat.

EXPENSES.

Sowing and harrowing,	$2 50
Seed wheat,	1 50
Harvesting and threshing,	4 18
Interest and taxes,	3 30
	$11 48
The yield, 11 bushels 3 pecks, $1.50,	$17 63
Fifteen hundred straw, 75 cents,	11 25
Income,	$28 88
Expenses,	11 48
Profit,	$17 50

Oats.—The land sowed with oats which I enter for premium contains five acres, more or less; the soil is loamy, with occasionally gravelly knolls; the land was manured and planted with corn last year, 1870; sowed with Bedford oats, April, 1871.

EXPENSES.

Sowed 14½ bushels oats, 75 cents,	$10 87
Sowing,	1 60
Ploughing and harrowing,	14 40
Harvesting and threshing	83 97
Interest and taxes,	15 90
	$126 74
The yield was 299 bushels, at 75 cents per bushel,	$224 25
Five tons straw, $15 ton,	75 00
Income,	$299 25
Expenses,	126 74
Profit,	$172 51

N. B. We make it a general rule to plough our mowing land or hard ground in about six years after seeding to grass, and plant sometimes one and sometimes two years as the sod gets rotten.

JOSIAH GIBBS.

WORCESTER NORTH.

From the Report of the Committee.

In determining the amount of corn grown per acre the following mode was adopted: an average square rod was selected from each field, and the quantity thus taken was dried, shelled and weighed, December 4th; the number of pounds from each square rod being multiplied by 160 was acknowledged to be the weight per acre of each field. For convenience, we here exhibit a table giving the weight of ears; also that of shelled corn, shrinkage, &c.

FIELD ENTERED BY	No. hills per sq. rod.	No. ears per sq. rod.	Weight ears per sq. rod., lbs.	Weight shelled corn per square rod, lbs.	Weight cob per sq. rod, lbs.	Weight shelled corn per acre, lbs.	No. bushels per acre.
Mr. Kilburn, . .	42	134	24	19 1/2	4 1/2	3,120	55 5/8
Mr. Putnam, . .	22 1/2	83	24 5/8	19 5/8	5	3,300	58 1/14 3/4
Mr. Page, . . .	27 1/2	147	38 1/2	31 1/2	6	5,200	92 5/8
Mr. Goodrich, . .	27	181	47 1/2	41 5/8	5 7/8	6,660	118 1/14 3/4
Mr. Kilburn's wheat, .	–	–	–	9	–	1,440	26
Mr. Putnam's rye, .	–	–	–	12 1/3	–	2,000	35
Mr. Page's oats, . .	–	–	–	15 1/2	–	2,480	77 1/2

For further information in regard to the above fields the reader is referred to competitors' statements as below.

It appears from the statements of the competitors that the average cost of growing an acre of corn does not exceed $35, and the value of manure and fertilizers about the same, making the gross amount $70, and the cash value of the same $100. This question has received no small amount of discussion. One farmer, who has been successful in growing corn, feels quite sure that his field has not cost so much labor or manure as it would had he cultivated the same with Swedish turnips, and it is far the most valuable to feed to stock; another

experienced and scientific farmer will tell us—*has* told us—of the enormous amount of turnips taken from an acre of light soil, by using a few loads of compost manure scraped up from the barnyard, and applying 4 or 5 cwt. of superphosphate; and from his own observation and experience it is much the best and cheapest feed for horses as well as for milch cows and working oxen; probably corn-growing is the forte of the one and turnips that of the other. But where is the proof on either side? None has been shown. Having had some experience ourselves in growing both corn and turnips; having also gleaned pretty carefully from those of large experience, we venture to make a few figures showing the relative money value of each; also the comparative value of the other cereals, and the value of hay compared with other crops. Suppose we take the corn crop as the basis, and we shall not come very far from the truth when we say that the cost of labor and manure for an acre of corn is the same in value as that of growing an acre of turnips. Again, it is reasonable to suppose that a field that will produce 1,000 bushels of turnips, or 25 tons=50,000 lbs., will give 80 bushels of corn, or 4,480 lbs.=$2\frac{1}{4}$ tons. The turnip abounds more in water than any other root. We have from the tables of Prof. Johnson, Agricultural College, as follows:—

	Wheat.	Rye.	Corn.	Turnips.	Meadow Hay.
Water,	15	12	12	86	16
Starch,	42	40	40	7	4
Gum and Sugar,	9	14	6	2	12
Nitrogenous substances,	15	13	17	$1\frac{1}{2}$	7
Oil,	2	3	9	$\frac{1}{2}$	3
Woody fibre,	15	16	14	2	50
Ash,	2	2	2	1	8
	100	100	100	100	100

Therefore we see by the above table, if it be correct, and there is no evidence that it is otherwise, that the milking and fattening properties of corn are to the turnip as 72 to 11, but we have 50,000 lbs. turnip to 4,480 lbs. of corn, or 25 tons of turnips to $2\frac{1}{4}$ of corn; now 11 per cent. of the turnip—the other 89 per cent. being water, woody fibre, &c., and of no

value—being multiplied by 50,000 gives 5,500 lbs. of turnip per acre of real money value, and by estimating the price of corn at $1.75 per 100 lbs., or 1¾ cents per lb., we have 5,500 lbs. at 1¾ cents=$96 25, to which we add the value of the tops, estimated by growers generally from $3 to $5, and we have in round numbers, $100 as the value of the turnip crop per acre; and by the same reasoning we have the value of the corn, whole weight 4,480 lbs., 28 per cent being of no value, leaving 72 per cent. of valuable material, and this multiplied by the number of lbs. per acre, 4,480,=3,225 at 1¾=$56.43; now we suppose that an acre of land that will produce 80 bushels of corn will yield at least 2 tons of stover, which if well cared for is worth (this year) $40, which added, gives the gross amount $96.43, showing a slight difference in favor of the turnip.

If we assume 25 tons of turnips per acre, it is just to say that 30 bushels of wheat can be grown on the same or similar soil of equal tilth, at 60 lbs. per bushel=1,800. Five bushels of wheat usually will yield one bbl. flour, hence an acre at that rate would give 6 bbls. flour, at $10.50=$63, to which we add the value of the middlings, 600 lbs. at 1½ cts.=$9; also the value of the straw, 1 ton, $20, making in the aggregate, $92, being about as much less in value than the other crops as the cost of cultivation.

It is plain that rye for soiling may be and is a profitable crop, as it can be grown and used at a season when we have nothing else. A piece of greensward that is run out for grass, ploughed in August and manured with some fertilizer, as leached ashes or superphosphate, giving the young roots a strong foothold to withstand the freezings and thawings of winter, and an early start the following spring, if the season is favorable the crop is ready to cut by 20th of May or 1st of June, and the field may be cleared of this crop in June and another crop be sown or planted for soiling; when the second crop is removed, first of September, with another dressing of manure or some fertilizer, the land may again be in good tilth for another crop: thus two crops may be taken for soiling, provided we replenish liberally with manures or fertilizers. The rye crop we consider a profitable one where the soil is suitable, as the straw readily sells at nearly the price of good hay.

Another class of crops used for feeding, being the foundation of all others, is the grasses; these contain when made into hay some 14 or 15 per cent. of water; in the green state, before drying, some 80 per cent. The dry part consists largely of woody fibre, say 50 per cent.; besides this there are valuable quantities of nutritious bodies, gum, sugar, oil, &c., to the amount of 26 per cent. in meadow hay; the amount in English hay not stated in the table.

The time of cutting has much to do with the nutritive value of hay; when the leaves and stems are green they contain large quantities of sugar and gum, which as they ripen are changed into woody fibre; and every experienced farmer well knows that large portions of these are lost before they are fed; hence, after grass has attained its full size and height, it loses large portions of its nutritious qualities by delay of cutting.

It was a rule of the milk producers of Middlesex County, (Concord and Lexington) years ago, if harvesting the crop was delayed so late that the stalk above the upper joint could not be easily separated from the sheath, and the lower part of it became contracted and withered, the hay would not produce its full quantity of milk.

A question here presents itself, whether it is more economical for the farmers in Worcester North to employ labor at the present high prices to hoe corn and grow roots, or to spread the manure that is produced from a given grass field, every year upon the same, and grow good timothy and redtop.

What has been said in relation to early-cut hay, the same occurs in the straw of grains and corn stalks; if they are cut ten days before the grain is ripe, their quality for feeding is greatly improved compared to what they would have been if cut when fully ripe. This, with the quality and quantity of grain, shows a double advantage of early cutting.

Careful experiments have shown, with regard to wheat, that when cut twelve or fourteen days before fully ripe, the grain not only weighs heavier, but actually measures more,—is better in quality, producing a larger proportion of fine flour per bushel. When the grain is in milk, it has comparatively a small amount of woody fibre; nearly the whole is gum, sugar and starch, with a large per cent. of water. If cut ten or twelve days before fully ripe, the proportion of woody fibre is still small;

but as the grain ripens, the thickness of the skin rapidly increases, at the expense of the sugar and gum; these, of course, must diminish in a corresponding degree, and the quality of the grain is of course injured; and what is true of wheat, we may readily suppose is the case with other grain.

The remark is frequently made, that, to grow a good crop of any grain, or root crop, the first work of importance is, good work done with the plough. This, of course, is important; still, we believe another branch of farming, yet however in its infancy, underlies it; and that is, field drainage.

The question comes, what lands need drainage? Every observing, thoughtful, progressive farmer, however young, may have noticed in his mowing fields what is known by the name of hand pod, or five-finger, or fine meadow-grass, instead of our own good old timothy or redtop. In fact, any of these aquatic, water-loving grasses, indicates cold water at a short distance below the surface. Finally, if we are suspicious of stagnant water near the surface, a pretty safe rule is to make a few shafts in the field, three feet deep or so, and note the rise and fall of water in the pools after a heavy rain or thaw, and in case the water leaves the pools in a day or so, it is evidence that the roots of plants will not be injured by stagnant water. But if water remains in the pools a foot or two deep till late in spring, or midsummer, rest assured the roots of plants will suffer, unless the water be removed by underdraining; and what we mean by this is, a drain from three to three and a half feet deep, and completely covered. Drains left uncovered are nuisances; although they draw off the water a few years, they become filled up from the falling down of earth on either side and other rubbish, and are again required to be cleaned out; otherwise they *don't* perform their office. Aside from this, either side of the ditch becomes a complete harbor for weeds, thistles and other rubbish, thus losing the use of a strip of land at least half a rod wide the whole length of the drain. Another kind of drain that answers very well for a few years is, to dump the stone into the ditch at random, and level off the field. This kind of drain was made by the writer some thirty years ago, but in fifteen years became worthless, and has since been relaid at about the same cost as at first; so we infer that either of the above methods are loose ways of farming. When drains

are properly constructed, that is, with stone at the bottom from six to eight inches in diameter, and covered with good flat stone, leaving an aperture from six to eight inches square, and the remainder filled to within twelve or fifteen inches of the surface with small stone and earth, the water that falls upon the soil does not remain in, or on the surface, to stagnate, or run away over the surface, washing away the best of the soil; but gradually sinks down, carrying with it the fertilizing substances from the surface, for the nourishment of plants, and with it we may say, gives air and warmth, both essential to the growth of plants. Under these new influences, the soil becomes dry and warm, and plants, we have reason to believe, flourish, which would never grow on it to perfection, if they grew at all. It is a fact, too, that such soils resist drought better than before. And for the simple reason that the plants are better able to send down their roots in search of food, without ever finding anything poisonous or hurtful; every part is penetrated with air, and consequently is drier and lighter. Such effects cannot be expected, however, the first year, in a wet, clayey subsoil; the change is gradual, but sure. We venture to say that large portions of the manure or fertilizers applied to cold, wet, clayey soils are not of so much value, by fifty or seventy-five per cent., as on the same soil when properly drained.

We here suggest a method for growing a field of corn, on a piece of grass land intended for that purpose next spring. Commence at once by drawing out manure from the barn cellar, and broadcast the same, until we have the required quantity for the field. Next spring, have the field ploughed at a proper time, and planted as soon as the season will permit, using a certain amount of bone meal, or superphosphate upon the surface, for the purpose of giving the seed an early start, and forcing the plant through June. We see no reason why a field of corn may not be grown at much less expense than the common way of drawing out the manure in the spring when "work drives," and when, perhaps, hay and labor are bought at high prices.

We have alluded to ploughing, and what we would be understood by the term is, that the whole sod should be moved at a proper and uniform depth and width,—the whole sod completely turned. But what observing farmer has not noticed ploughing to be done "in this wise:"—in the first instance the implement

used was one entirely unfit for the work, and perhaps the ploughman the same; consequently, there will be places where the sod will be cut fourteen or fifteen inches wide, and two-thirds of it turned, and the other one-third unmoved. Other places, the sod, perhaps, is cut for several feet from two to three inches deep, and again the point of the plough, or what should be the point, runs upon the surface as many more feet, and then plunges into the soil to the full extent, leaving the sod "tilted up" edgewise, to be levelled with the so-called ploughing by the harrow. Now, it is clear to our minds that bad ploughing cannot be remedied by harrowing, hoeing, or any other field work, as there will be places in the soil that will not be moved; consequently, we find in the soil hard, sterile places that cannot be penetrated by the small rootlets of the plants. They work and struggle on for a while, but finally droop and die: so there is nothing gained, but much lost, by inefficient ploughing. Therefore, it is hoped that the trustees of Worcester North Agricultural Society will again put the ploughing back into the fields, and not only offer prizes to men, oxen and horses, for good ploughing, but to boys and steers also.

Every practical farmer very well knows, as a general rule, that soils should not be moved by the plough when wet; more especially so when the subsoil is clayey. After ploughing, when the surface becomes dry and crumbly, the field should be harrowed, using "Shares harrow" for the purpose of breaking the lump, and leaving a smooth, even surface.

The question is sometimes asked if ploughing serves to enrich the soil. In answer, we reply that frequent ploughing serves to produce a disintegration of the particles, and make the soil more porous, thus giving free admission of air into the soil, charged with moisture, as it serves as a fertilizer, and thus hastens the crop; which is frequently of much importance, especially to the market gardener, when he can have his crop ready for the market three days sooner; the extra price of his crop perhaps would amply remunerate him for ploughing his lands two or three times; and so again by having a field of corn ready to harvest a week sooner, might save the whole field from being destroyed by an early frost.

A deep and thorough pulverization of the soil is necessary to the germination of the seed, and the ready extension of the roots

in the soil. If the soil is lumpy and coarse, and does not come in close contact with the seed, to keep moist, the seed *can't* germinate, the roots *can't* extend in search of food, nor can this food be prepared and transmitted to the plants, unless the soil is so pulverized as to admit the free circulation of air and moisture through its interstices, and through its mass. As before stated, the air and dews being charged with elements of fertility, the more porous the earth is made, the more easily are these elements conveyed to the seed.

Generally, we believe that farmers do not use such care in selecting and planting seed as is necessary, and from this cause, and from having the soil so ill prepared to receive it, a very large per cent. does not germinate, and the part that does is of a half-starved and sickly kind. In selecting seed of any of the cereals, if the grain is threshed by machines and the seed used for sowing or planting, we unquestionably get a large per cent. of half-grown, shrivelled seed, unfit for planting. By this mode of selecting seed, and having the soil half ploughed and harrowed, we may expect to reap a half-grown harvest; but when the grain is lightly threshed by the flail, or only half the seed shelled out, to be used for that purpose, we may expect to have large, healthy, plump seed, such as will germinate and produce a full crop of grain, requiring no more labor, or manure in the cultivation, than the poor, sickly, half-grown crop. Again, we believe that small seeds are frequently too deeply planted; the seed, after being sown, requires air, warmth and moisture, by which the seed undergoes some change, and on swelling, a young, tender root bursts forth from the shell, and, in obedience to the laws of gravitation, goes downward in search of food, while at the same time a stalk shoots upward towards the surface, to form the plant. These small roots that first make their appearance, are fine and delicate; they move downward for food to nourish the young plant; hence the food for roots thus tender should be sweet and nutritious, and if it be not found, the plant droops and withers, perhaps dies; or if it be found only in small quantities, and of an insipid kind, it produces a poor, sickly plant; or if the soil be hard and lumpy from bad ploughing, and does not come in contact with the young roots, we have only a half-starved plant, or tree. Here, again, the importance of thorough ploughing, and a deep pulverization of soils, is apparent.

The question has again and again been discussed at farmers' clubs and elsewhere, in regard to the quantity of seed to be sown or planted, upon a given quantity of ground. But after all, every farmer must be his own judge, as it depends upon many circumstances, such as the kind of soil, its tilth, pulverization, &c., and again, the quality of the seed. When the seeds are plump and healthy, and the soil well ploughed and well prepared otherwise, a much less amount of seed should be used ; as we notice in two of the competitors in growing corn the present year, while the competitor having the greater yield had the less number of hills per rod, or as nine to fourteen, the competitor having the greater amount of corn estimates the stover at about two tons, while the other judges he has from four to five ; so that the gain of the one, or the loss of the other, is not so great as at first appears.

EPH'M GRAHAM, *Chairman.*

Statement of Luther Page.

CORN.—The crop of the field on which my corn was raised was grass in 1869, with no manure. The land was ploughed in 1869 six inches deep, and planted to corn in 1870, with fifteen loads of good compost manure to the acre. The surface soil is mostly yellow loam, with clay subsoil.

It was ploughed once this spring, six inches deep, well harrowed, and furrowed three feet apart, one way only. The cost of ploughing and other preparation was $7.50. Fifteen cords of good compost were spread, and a small handful of phosphate was put in each hill. The value of the manure for both seasons was $75. Planted by hand, from the middle to the last of May, with Carter and Groton eight-rowed yellow corn. The cost of seed and planting was $3.50. It was worked with cultivator twice, at a cost, including weeding and thinning, of $9.75. The most of the crop was cut and stooked, the remainder topped about September 8th to 10th. Cost of harvesting, storing and husking, $9.

Statement of Cyrus Kilburn.

WHEAT.—The soil of the acre upon which my wheat was raised, is a clayey loam. The crop in 1869 was grass, to which

no manure was applied. In 1870, the crop was winter wheat, which had sixteen loads of barn manure. It was ploughed twice, six inches deep, and the seed was washed and ashed before sowing. The cost of ploughing and other preparation was $6. For the crop of 1871, twenty loads, thirty bushels each, com post manure, were spread and ploughed in. The value of the manure upon the ground was $25. The seed (blue stem winter wheat) was sown the 20th of September. Cost of seed and sowing, $7. The crop was cradled the middle of July. Cost of harvesting and threshing, $10. The weight of straw was one ton, and of grain, 1,440 pounds. The sowing was delayed a full fortnight, on account of extremely dry weather which was very unfavorable for the crop.

Statement of J. P. Putnam.

Rye.—The soil on which my rye grew is a gravelly loam. The crop of 1869 was corn, which had seventeen loads, thirty bushels each, of good manure, per acre. The crop of 1870 was oats, to which no manure was applied. After harvesting the oats, the land was ploughed, in August, eight inches deep, and then harrowed, at a cost of $5 per acre. One hundred and fifty bushels leached ashes were spread, at a cost of $22 50 per acre. The seed was 1½ bushels of white winter rye per acre, which, including sowing, cost $2.87. The crop was mowed and bound in July, at a cost, including threshing, of $12 per acre. The weight of straw was 3,320 pounds, and of grain, 1,960 pounds, per acre.

Statement of Luther Page.

Oats.—The soil on which my oats grew is clayey. The crops of 1869 and 1870 were grass, with no manure. It was ploughed six inches deep the first week in May, 1871, and then thoroughly harrowed, at a cost of $7.50. Twenty loads of rich compost manure were spread broadcast, worth upon the field, $40. It was sown on the 4th of May, with 2½ bushels of black New Brunswick oats. The cost of seed and sowing was $4 50. The crop was mowed August 11th, a large part of it being badly lodged a few days before cutting. The cost of harvesting and threshing was $12. The weight of straw was 4,000 pounds, and of grain, 2,470 pounds, per acre.

HAMPDEN.

Statement of William Mattoon, of Springfield.

Western Corn grown in Massachusetts.—The land on which I grew this corn is commonly called sand-plain, and is $3\frac{18}{160}$ acres in extent. I have owned it five years. The first year a crop of rye was taken off, yielding about 9 bushels per acre. Since that it has lain idle, it being too poor to produce grass. Last season it was ploughed twice, ten inches deep. This season, just before planting, put on twelve cords hog, horse and cattle manure to the acre, which was spread and immediately ploughed in ten inches deep. Then took six hundred pounds of salt and two hundred pounds of plaster to the acre, mixed, and spread broadcast, and harrowed thoroughly. Next, I marked the ground into squares with a four-toothed marker, making the rows come $3\frac{1}{2}$ feet apart.

On the 9th and 10th of May, planted the yellow-dent corn, taken from a car-load of second quality (there being none other in market) from Peoria, Ill. Nothing was put in the hills with the corn.

EXPENSES OF THE CROP.

Ploughing 3 times, two days each, at $4 a day,	$24 00
Harrowing two days, at $4 a day,	8 00
$40\frac{1}{2}$ cords of manure, at $8 per cord,	324 00
1,900 pounds of salt, at $13 per ton,	12 35
600 pounds of plaster, at $11 per ton,	3 30
Hauling $40\frac{1}{2}$ cords of manure, at $1 a cord,	40 50
Spreading manure two days, $1.75 a day,	3 50
Mixing and spreading salt and plaster,	2 50
$\frac{3}{4}$ bushel of seed corn, at 80 cents a bushel,	60
$4\frac{1}{2}$ days planting, at $1.75 a day, including board,	7 88
1 day, man and horse, cultivating first time,	3 00
$5\frac{1}{4}$ days, first hoeing, at $1.75,	9 19
$1\frac{1}{2}$ days, cultivating second time, both ways,	4 50
4 days, second hoeing, at $1.75,	7 00
$4\frac{3}{4}$ days, topping stalks, at $1.75,	8 32
Husking, by contract,	12 00
Hauling corn to barn,	1 25
Interest on land,	36 00
Taxes,	9 00
	$516 89

RECEIPTS.

By 3 tons of stalks, at $10.00 per ton, . . .	$30 00
207½ bushels of corn, at 88 cents a bushel, .	182 00
¼ part of manure in ground unexpended, . .	84 91
	$297 51

On the 9th of October a committee of the Hampden Agricultural Society examined this field of corn, which was very straight and clean, and harvested an average portion, containing 262 feet, being 10 feet less than a square rod. The corn was husked, found to weigh 45 pounds, and carried to the store of Ferre, Batchelder & Co. for safe keeping and drying. Here it remained suspended in an open basket till the 29th of November, when its weight was found to be 31¼ pounds. It was then shelled and cleaned, and its weight found to be 22½ pounds, having shrunk by drying, shelling and cleaning, just one-half the original weight of corn and cob. The yield per acre, calculated after the shrinkage, is 66 4/5 1/6 bushels. The weight of a measured bushel was found to be 54⅜ pounds, and the cost about $2 per bushel.

Believing that this lesson of shrinkage and loss is worth the trouble of the experiment and premium, we have made the award. If all premium crops of corn were subjected to the same searching test, there would doubtless be less bragging of great yields, and less corn would be raised. Whether it will pay to raise corn now in New England, is a mooted question. At the time of this last weighing, corn was selling in the large markets of Illinois at 30 cents for 56 pounds shelled, and 27 cents for 70 pounds in the ear, these being the standard weights per bushel, and the price of corn meal in Springfield, Mass., was $1.80 per 100 pounds. The dealers claim that the difference in cost is mainly chargeable to high freights.

PHINEAS STEDMAN, *for the Committee.*

FRANKLIN.

Statement of C. B. Merritt, Conway.

WINTER WHEAT.—The wheat which I offer for premium was raised on 165 rods of land that had been set to tobacco for the

past two years. The soil is a gravelly loam. About the middle of September, 1870, the land was ploughed six inches deep, and sowed to wheat, using 2½ bushels of seed. The only fertilizers used were 22 bushels of ashes and 5 bushels of salt, strewn broadcast and harrowed in with the seed; but the land, having previously been set to tobacco, was in good condition. I was obliged to turn my cattle into the lot soon after it was sown, and as fast as it grew up was fed off. I thought it might be much injured, but, after taking out the cattle, November 1st, it thickened and spread so that it was quite heavy when the ground froze for the winter. I think the feeding was a decided benefit to it. I was advised by some to harrow it in the spring, because it was so thick, but did not, and have had no cause to regret it.

VALUE OF CROP.

55 bushels wheat, at $2,	$110 00
2½ tons straw, at $12,	30 00
1 ton hay,	15 00
	$155 00

EXPENSES.

Ploughing, sowing and harrowing,	$10 00	
Seed,	6 25	
Harvesting and threshing,	17 50	
		33 75
Net gain,		$121 25

Statement of John L. Banks, Northfield.

The land on which my wheat was raised, was three acres of sandy loam. In 1869 two acres were planted to corn, using about 10 bushels of ashes and 300 pounds of plaster to the acre; the other was in clover. In 1870 I spread on 30 loads (of 30 bushels each) of manure to the acre and ploughed it in, ploughing four inches deep. Early in June I ploughed again, ploughing six inches deep, and set to tobacco, using Peruvian guano and phosphate at different times, and hoeing it in. About the 15th of September I ploughed the land and sowed to wheat, using no manure. The seed I rolled in plaster, and used 2 bushels to the acre. The ground was harrowed lightly before

sowing, and thoroughly after sowing. I rolled the land well and did not feed it at all. In May, 1871, I harrowed well with a light harrow, at the same time sowing my grass seed for seeding.

VALUE OF CROP.

117 bushels wheat, at $2,		$234 00
4½ tons straw, at $15,		67 50
4½ tons stubble, at $18,		81 00
		$382 50

EXPENSES.

Ploughing, sowing and harrowing,	$15 00	
Value of seed,	12 00	
Harvesting and threshing,	51 00	
		78 00
Net gain,		$304 50
Net gain per acre,		101 50

Statement of F. H. Williams, Sunderland

Rye.—In September, 1870, I sowed 1½ bushels of white rye on an acre of first quality sandy loam, using no manure or fertilizer; but, as the land had been set to tobacco in 1869 and 1870, it was in good condition. I did not plough the land before sowing the rye, but harrowed it thoroughly afterward. The land was sowed to grass in the spring of 1871, and a good crop cut after harvesting the rye.

VALUE OF CROP.

42½ bushels rye, at $1 08,	$45 90
1½ tons straw, at $15,	22 50
	$68 40

EXPENSES.

Sowing and harrowing,	$1 25	
Value of seed,	2 50	
Harvesting and threshing,	14 00	
		17 75
Net gain,		$50 65

Statement of D. O. Fisk, Shelburne.

Corn.—The corn entered for a premium was raised on a piece of two acres of good tillage land, worth from $40 to $50 per acre. I took the rocks all out clean, by digging and blasting. I planted the eight-rowed variety of yellow corn, and harvested from the piece 188 bushels of sound corn, weighing 58 pounds to the bushel.

I raised corn on the same land in 1869, and Surprise oats in 1870. The land was ploughed in April, seven inches deep, ploughing in twenty loads (of 30 bushels each) of manure, and then harrowed thoroughly. The corn was cultivated with a one-horse cultivator, and hoed three times. I harvested the corn by cutting up at the roots, stooking until well cured, and then husked and put in the bin. According to the best estimate I can make, my corn for the last three years has not cost me over 50 cents per bushel.

PLYMOUTH.

Winter Rye.—Joseph Kingman, of West Bridgewater, raised 23 bushels of rye upon 165 rods of land, being at the rate of $22\frac{2}{7}$ bushels per acre, and 3,200 pounds of straw. He says, in his statement: "The land on which I raised my rye is what farmers call 'old field,' having been under cultivation since the early settlement of the country. It has been cropped repeatedly and but slightly manured. In 1868 and 1869 it was planted to corn, and in 1870 to potatoes, manured each year with 15 loads of 30 bushels each of barnyard manure. Sept. 9th and 10th, 1870, it was ploughed 6 inches deep, and sowed with one bushel of rye, of the kind grown on the farm for more than fifty years, and also with grass seed; harrowed twice and rolled with a heavy roller. The grass seed looks remarkably well. The expenses were, for ploughing, harrowing, &c., $6; seed, $1.50; harvesting $4.50; total, $12."

Richard Thayer, of West Bridgewater, entered a field of winter rye for premium, but as it appears from his statement that the piece contained but about three-fourths of an acre, the entry is not within the rules. His crop was a good one, being at the rate of $22\frac{1}{3}$ bushels per acre, and was grown on light sandy soil, on which corn was raised in 1869, and potatoes in 1870. Ploughed 7 inches deep, and sowed with rye, Sept. 15th, 1870.

Mr. Thayer thinks rye is a good crop for land which is to be laid down to grass, the grass seed to be sowed on the surface early in the spring, when it will take well and yet not be forward enough to injure the rye. He has followed this method for many years and has always had good crops of grass.

West Bridgewater seems to be well adapted to the cultivation of rye, the published statements of the society showing that in past years nearly all the premiums for this crop have been awarded to residents of that town. Mr. Kingman's "old field," from which he has just taken four good crops, in four successive years, without any great outlay for manure, must certainly be a very desirable kind of field to own, considering the small amount of labor required for cultivating it. Rye is just now a very profitable crop to raise on soils adapted to it, the straw being worth what, in former years, would have been thought a high price for the best of English hay.

Indian Corn.—Albert Thomas, of Middleborough, the only competitor for a premium on corn, says in his statement: "The acre of land on which I raised the corn entered for premium, is a dark sandy loam, in grass unmanured in 1869 and 1870. It was ploughed in May, 8 inches deep, turning under 35 loads, of 30 bushels each, of manure from my barn cellar; planted May 12th, with Whitman corn, in rows $3\frac{1}{2}$ by 3 feet apart; cultivated both ways and hoed twice; harvested during the last half of October. Product $94\frac{7}{56}$ bushels of corn, at $1, $94.12; 3 tons of stover at $15, $45; total, $139.12. Expenses: ploughing, harrowing, &c., $6; manure ploughed in, $35; hen manure and ashes in hills, $3; seed and planting, $6; cultivation, $8; harvesting, $6; total $64; balance in favor of the crop, $75.12."

Oats.—Albert Thomas, of Middleborough; one acre of sandy loam, in corn in 1869; manured with 35 loads, of 30 bushels each, of barn cellar manure. In potatoes in 1870, manured with 20 loads of similar manure. Ploughed twice, 9 inches deep, in April, 1871; 3 bushels of common oats sowed April 20th with grass seed, and harrowed in; harvested July 20th, by cradling. Product, 2,026 pounds, equal $63\frac{10}{32}$ bushels of oats, weighing 35 pounds to the level bushel, and two tons of straw. Expenses: ploughing and harrowing, $8; seed and sowing, $3; harvesting, $7; total, $18.

HINGHAM.

From the Report of the Committee.

INDIAN CORN.—Although the time of visiting the crops was delayed until quite late in the season, the several fields were visited while growing, and each presented a very handsome appearance, being of lively color and uniform growth. The ears, already well grown, gave promise of becoming large and full, promising an abundant yield of fine, ripe corn. And well was the promise fulfilled, as the following results show:—

From the field of one acre, entered by Mr. David Whiton, two rods were selected and harvested October 5th, the product of which was shelled December 1st, and weighed 71 pounds, giving $101\frac{24}{56}$ bushels to the acre.

The same measured $42\frac{5}{100}$ quarts, giving $106\frac{25}{100}$ bushels to the acre. The cobs weighed 20 pounds.

The product of the two rods selected from the field of one acre, entered by Mr. Fearing, harvested October 9th, and shelled December 2d, weighed 79 pounds, giving $112\frac{48}{56}$ bushels to the acre. The same measured 46 quarts, giving 115 bushels to the acre. The cobs weighed $19\frac{1}{4}$ pounds.

The product of one rod from the field of the half acre, entered by Mr. Joseph Thomas, harvested October 9th, and shelled December 2d, weighed 43 pounds, giving $61\frac{24}{56}$ bushels to the half acre, and $122\frac{48}{56}$ to the acre. Cobs weighed $10\frac{3}{4}$ pounds.

The product of one rod, selected from the field of the half acre, entered by Mr. Fearing, harvested October 9th, and shelled December 2d, weighed 37 pounds, giving $52\frac{48}{56}$ bushels to the half acre, and $105\frac{40}{56}$ to the acre. Cobs weighed $9\frac{1}{2}$ pounds.

The same measured $21\frac{25}{100}$ quarts, giving $53\frac{1}{8}$ bushels to the half acre, and $106\frac{1}{4}$ bushels to the acre.

One rod from the field of the half acre, entered by Mr. Whiton, harvested October 5th, and shelled December 1st, yielded thirty pounds of shelled corn, giving $42\frac{48}{56}$ bushels to half acre, and $85\frac{40}{56}$ to the acre. The same measured $18\frac{75}{100}$ quarts, giving $46\frac{87}{100}$ bushels to the half acre, and $93\frac{75}{100}$ bushels to the acre.

The product of the rod taken from Mr. Thomas's field measured $23\frac{75}{100}$ quarts, giving $59\frac{37}{100}$ bushels to the half acre, and $118\frac{75}{100}$ bushels to the acre: four bushels less than the yield

by weight, thus reversing the rule of the other fields, all of which measured more bushels than they weighed.

It will be seen by referring to the statements of the competitors that their corn has been raised at a less cost than has ruled in the market prices the past season. That of Mr. Fearing, from his acre, cost per bushel, 69 cents; half acre, 74 cents.

Mr. Thomas's corn, according to his statement cost 81 cents per bushel; but he did not give credit for the full value of his fodder. Allowing that to be equal to Mr. Fearing's, it will reduce the cost of his corn to 60 cents per bushel. Mr. Whiton's statement is not at hand at the time of writing this; therefore we cannot speak of the cost of his corn, but presume it will not be far from the foregoing estimates.

FRANKLIN HERSEY, *Chairman.*

Statement of Hon. Albert Fearing.

I enter for premium one acre of yellow corn. The soil is a gravelly loam The land was in grass in 1870, without manure. Ploughed eleven inches deep, and applied eight cords barn manure; planted with yellow corn, five kernels in the hill, three feet apart each way.

COST OF CULTIVATION.

Ploughing,	$8 00
Cultivating,	21 00
Harvesting,	14 00
Seed,	50
Eight cords manure,	64 00
Manure in hill,	12 00
	$119 50

PRODUCE.

1½ tons top stalk, $15 per ton,	$22 50
2 " butt " $10 "	20 00

The committee report the yields to be $112\frac{48}{56}$ bushels of corn by weight, and 115 bushels by measure, to the acre.

ALBERT FEARING.

Statement of David Whiton, Esq.

A crop of corn presented for the premium of the society, the quantity of land being one acre :—

The nature of the soil is a sandy loam, and the land was in grass for the two previous years. The ploughing was done in August, 1870, and was twelve inches deep, two men and four oxen occupying one day in the labor. Half a day with a pair of horses was spent in harrowing, and two hours with horse and hands in furrowing.

Nine cords of stable manure, with one-fourth mixture of meadow mud, were hauled on and ploughed in four inches deep, in May,—the value of the manure on the ground being sixty-three dollars. To this were added three casks double-refined Lodi poudrette.

The planting was made the 19th of May, and seven quarts of Colman corn were used in seeding,—the cost of the seed being fifty cents. The hills were $3\frac{1}{2}$ feet apart each way, and $3\frac{1}{2}$ days' work was spent in planting.

The crop was cultivated once and hoed twice, in doing which seven and one-half days were spent. Two days were spent in cutting and shocking stalks, and six days in harvesting, including husking.

There were two tons of top-stalks, valued at $15 per ton, and three tons of bottom stalks, valued at $15 per ton.

The yield of corn, as reported by the committee, was $101\frac{24}{56}$ bushels to the acre by weight, and $106\frac{25}{100}$ bushels to the acre by measure.

DAVID WHITON.

Statement of Expenses on one-half acre of Corn, by Joseph Thomas.

Manure, ploughed in, 3 cords at $8,	$24 00
Hen manure, 2 barrels at $1,	2 00
Wood-ashes (in the hill), 1 barrel at	75
Salt-mud and sand, 1 cord at	2 00
Labor—getting out manure,	5 00
" ploughing,	3 50
" furrowing,	1 00
Seed, half peck,	25

Labor—planting, ...	$1 50
" cultivating and hoeing, 1st time, . . .	3 00
" " " " 2d " . . .	3 00
" hoeing, 3d time, ...	4 00
Total cost, ...	$50 00

Ground planted with corn the previous year. Rent of land and expense of harvesting considered covered by value of fodder.

JOSEPH THOMAS.

For the half acre of corn entered for premium by Joseph Thomas, the committee report the yield to be $61\frac{24}{56}$ bushels to the half acre, or $122\frac{48}{56}$ to the acre by weight; and $59\frac{37}{100}$ bushels to the half acre, or $118\frac{75}{100}$ bushels to the acre by measure.

Statement of David Whiton, Esq.

The quantity of land being half an acre :—

The land was in grass for the two previous years, and the soil is a sandy loam. May 1st, it was ploughed twelve inches deep, one yoke of oxen, one pair of horses, and two men spending half a day in the operation. Three hours with one pair of horses were spent in harrowing, and one hour with two men and horse in furrowing.

Four cords of stable manure with one-fourth mixture of meadow-mud were applied, the value on the ground being twenty-eight dollars. In addition to this, one cask and a half of Lodi double-refined poudrette was used.

The planting was made May 20th, and the hills were three feet and a half apart, each way. Four quarts of Dr. Nichols' corn were used for seeding, amounting to thirty cents, and two days' time was spent in planting.

The crop was cultivated once and hoed twice, which required four days' labor. One day was spent in cutting and shocking stalks, and three days were spent in harvesting, including husking. There was one ton of top stalks, valued at fifteen dollars, and one and one-half tons of bottom stalks, valued at fifteen dollars per ton, amounting to $22.50.

The yield reported by the committee was $42\frac{48}{56}$ bushels of corn by weight to the half acre, or $85\frac{40}{56}$ to the acre.

The same measured $4\frac{87}{100}$ bushels to the half acre, and $93\frac{75}{100}$ bushels to the acre.

DAVID WHITON.

Statements of Hon. Albert Fearing.

I enter for premium one-half acre of white corn. The soil is a gravelly loam. The land was in grass in 1870, without manure. Ploughed eleven inches deep. Applied four cords of barn manure, and planted with Whitman corn, five kernels in the hill, three feet apart each way.

COST OF CULTIVATION.

Ploughing,	$4 00
Cultivating,	11 00
Harvesting,	7 00
Seed,	25
Four cords manure,	32 00
Manure in hill,	6 00
Total,	$60 25

PRODUCE.

Three-quarters ton top stalks,	$11 25
One-quarter ton butt stalks,	10 00
Total,	$21 25

The yield reported by the committee was $52\frac{48}{56}$ bushels of corn to the half acre, or $105\frac{40}{56}$ to the acre.

The same measured $53\frac{1}{8}$ bushels to the half acre, and $106\frac{1}{4}$ bushels to the acre.

RYE.—One acre of rye. The soil is a gravelly loam, and was planted with corn in 1870.

Six cords of manure were applied. Rye was sowed in October, and four hundred pounds of guano harrowed in.

PRODUCE.

3,360 pounds straw, at $27 per ton,	$45 03
31 bushels of rye, at $1 per bushel,	31 00
Total,	$76 03

EXPENSES.

Ploughing,	$8 00
Manure,	16 00
Seed,	1 00
Harvesting,	15 00
Threshing,	8 00
Total,	$48 00

One acre of barley. Soil gravelly loam. Corn and roots in 1870. Used for this crop eight cords of barn manure. In the crop of barley, applied four cords coarse barn manure; ploughed eight inches deep, harrowed three times, and rolled once. Sowed April 25th, and harvested August 10th.

PRODUCE.

3,200 pounds of straw, at $12 per ton,	$19 20
45 bushels of barley, at $1,	45 00
Total,	$64 20

EXPENSES.

4 cords of coarse manure,	$28 00
Ploughing, &c.,	14 00
Seed,	2 50
Harvesting and threshing,	10 00
Total,	$54 50

ALBERT FEARING.

TOBACCO STATEMENT.

HAMPDEN.

My three-fourths of an acre of tobacco grew on turf-land that yielded about one ton of hay per acre. On the first of June last, nine cords of stable manure were ploughed under, about eight inches deep. Some eight weeks later, and just before setting, four and a half cords more of stable manure were put on, and harrowed in.

I then furrowed out the rows, $3\frac{10}{12}$ feet apart, and dropped phosphate in the hills two feet apart. The plants were set about the middle of June, and cut and hung the first of September. The cost of the crop is pretty nearly as follows:—

Man and team, $3\frac{1}{2}$ days hauling manure, ploughing and harrowing, at $4 per day,	$14 00
Raising plants, setting, tending and harvesting 27 days, at $2.50 per day,	67 50
$13\frac{1}{2}$ cords of manure, at $8 per cord,	108 00
300 pounds Coe's superphosphate,	9 00
Stripping and hauling to market,	20 00
Total expenses,	$218 50
Sold 10,000 plants, at $1.50 per thousand, $15 00. The crop sold December 11th, for 35 and 10, and weighed as estimated by counting the hands; wrappers 1,300 pounds, fillers 300 pounds, which would make the receipts,	485 00
Gain,	$281 50

Burning brush on the tobacco bed after it is ready for sowing, I find, saves considerable weeding. A great fire might injure the manure, but a light one kills the seeds of the weeds. I usually seed down my tobacco land as soon as possible after cutting, and cut the next season about two tons of hay for a first crop, and one ton of rowen later.

GEORGE W. CONVERSE.

VEGETABLES.

ESSEX.

From the Report of the Committee.

Over thirty years ago I sold the first tomatoes ever brought into the market of my native town. At that time we knew of but one variety—the large red ; a year or two after, some of the purple sorts began to creep in. For several years past I have raised for seed purposes upwards of twenty varieties of this popular vegetable. Amidst so many varieties the new beginner stands confounded, asking, " What shall I plant?" Let us first examine into the characteristics of some of these varieties, and then, having these before us, we shall be prepared for a discussion of their merits. The old classification was into Large Red and Round Red ; Large Red meaning a large-sized tomato of an irregular shape, and Round Red, any flat-round or spherical sort. Grouping together such of the varieties now before the public as admit of being thus classified, under Large Red, Alger, Chihuahua ; and under Round Red, Wonder, General Grant, Charter Oak, Mammoth Cluster, Essex Early, Crimson Cluster, Orangefield, Powel's Early, Trophy, Valencia Cluster, Boston Market, Tilden, New Mexican, DeLaye, Rising Sun, Lester's Perfected, or Fegee, and New White Apple, Grape, Cherry and Plum. Some of these grow a little irregular, but for the most part are round in shape. Subdividing into spherical and flat-round, I should put into the first class Mammoth Cluster, Charter Oak, Orangefield, Essex Early, New Mexican, New White Apple, Grape, Cherry and Plum. Let me here note, that, probably owing to a growth interrupted by drouth, the second setting of the fruit of a round variety may be irregular in shape. Into the second class go the remainder, with the limitation that Tilden's Tomato, DeLaye, Cook's Favorite, Maupay, Keyes Trophy, and Rising Sun, hold nearly an intermediate position. Early York, Philadelphia Early, Hubbard and Dwarf Scotch, would be classed with Large Red, except for their size. The Fig Tomatoes, yellow and red, make a class by themselves.

Suppose a beginner was asked which of the sort he should plant for Large Red; I remark that Alger is early and prolific; Chihuhua is very late, enormously large, but apt to decay before fully maturing. I also add that the Round Red sorts are much the more popular in the market. Of the Round Red kind I will here remark, that for want of proper care in selecting seed stock, and also from a natural tendency to deteriorate, which may be influenced by locality and season, they will sometimes grow irregular in shape. Of those named, Cook's Favorite has so deteriorated with me, that for the future I shall not grow it. Tilden, though yet an excellent tomato, is not so regular in shape as when it was first sent out.

Let us now classify our tomatoes with reference to earliness. First, however, let us dismiss the Cherry, Grape, Plum and Fig sorts, with the remark that with the exception of the Fig they are all early sorts; that for flavor they cannot be surpassed; that they are all highly ornamental; that they are the best sorts for preserving in sugar; that they, particularly the Grape and Fig, are highly ornamental when seen growing, or brought on the table for decorative uses; and, finally, that the Fig, as its name would indicate, is fig-shaped, and has been so nicely preserved as to make quite a good imitation, in both appearance, color and flavor, to the fig of commerce.

Of no vegetable have we more conflicting testimony on the question of earliness than of the tomato. Let me state a few facts which will explain away some apparent contradictions. First, if the same variety of tomato be planted side by side in the same bed, on the same day, and the plants be transplanted on the same day, one lot on upland and the other on lowland, those on the upland will yield the earlier fruit. Second, if the same conditions be carried out, with the exception that the two lots be planted in the same location, but the soil in one part shall be richer than the other, those growing on the poorer soil will ripen the earliest fruit. Third, if every condition is the same, but a difference in exposure, one lot having a warmer spot, that lot will ripen the earliest fruit. Fourth, if seed of the same varieties be planted with a difference of some weeks between them, it is quite possible that those last planted may ripen earlier fruit, for the first lot may be dwarfed and otherwise injured by cold weather. Fifth, I am inclined to believe

that a trimming of both tops and roots will make a difference as regards earliness. Now if we find this difference where the same kind is planted, of course we shall find the same apparent difference in the matter of earliness where the two kinds are similarly treated, when in reality there would be no difference. I have also found in my experience that a kind which I knew by two years of experimenting as an early sort, when planted where it had apparently every condition to favor earliness, ripened its fruit later than any kind I raised that season; a lesson to me not to pronounce too emphatically from the result of the experimenting of a single season. I have found Early York, Hubbard (which I think is the same thing), Dwarf Scotch, Essex Early, Keyes and General Grant, among my earliest. Trophy is an early sort, though not of the very earliest; Maupay, Lester's Perfected (or Fejee), New Mexican and Valencia Cluster, I rank among my latest sorts.

Discussing the tomato with reference to size, I class Dwarf Scotch, Early York, Hubbard, Essex Early, Keyes, General Grant, Charter Oak, New White Apple and Orangefield, as below the average; and believe their peculiar place (of all but Orangefield) to be as early tomatoes, though in yield both Early York and General Grant are hard to surpass. The Trophy is decidedly the largest of tomatoes yet introduced that are available for market. The spherically round tomatoes are more apt to fail in filling out solid than the flat-round sort, and particularly is this true after the hottest part of the season is past. They are also more liable to be green, unripe and cracked near the stem than the other sorts. Tomatoes differ as much in flavor as do different varieties of apples; and soil and seasons appear to have some influence. Some are very sour, some sweet, others at times bitter, and again at times a rotten flavor is present. The quantity of the crop depends a great deal on its earliness. I have had a yield at the rate of over one thousand bushels of ripe tomatoes to the acre.

I pass from the general discussion to the merits and peculiarities of some of the varieties. I find both Alger and Keyes to be tomatoes of excellent flavor, and these are each distinguished by a foliage very similar to and suggestive of the potato, to which the tomato family is allied; the flavor of each of these vegetables suggests the other; and the fruit of the tomato suggests

strongly the ball of the potato. The Boston Market tomato is of good market size, is early, colors well all over and fills up very solid. This is the favorite sort around Boston, where leading market gardeners have their different strains. Around New York this kind has not always given such satisfaction, the gardeners there appearing to lay more stress on size than on some more valuable characteristics, which have to be sacrificed. General Grant closely resembles Boston Market, but is somewhat smaller, and perhaps rather more solid ; it may be a little earlier and is somewhat smoother. I consider this but a strain of the Boston Market. The Mammoth Cluster is large, round and showy, but is too inclined to be hollow to be considered an acquisition. Orangefield and New White Apple make a class by themselves. They may be called fruit tomatoes ; there are no other sorts that equal these for eating uncooked, as we eat an apple. They are somewhat small in size, but of elegant shape and color, contrasting beautifully with each other when brought on the table in a dish in their natural state. They peel as readily as a peach, and their flavor is unsurpassed. The vines of Dwarf Scotch, De Laye and Wonder are all dwarf in their habits and growth. DeLaye is a superb tomato, both in color and quality, when you can mature the fruit ; but it is very late and quite a shy bearer, so much so as to be of no value except for its curious habit of growth, the leaves being very dark green, and exceptionally thick, while the stalk is very stout. Wonder, I have grown but one season. It somewhat resembles DeLaye in habit of growth and bearing qualities, though the plant is larger and more productive. Dwarf Scotch is the most dwarf variety having the habits of the common sort with which I am acquainted. I consider it valuable to those gardeners who seek an early kind, and have but little room to spare. Keyes's Prolific was much over-praised when first introduced, and a reaction in public sentiment has caused it to be ranked lower than it deserves. It is early, a fair bearer, yielding fruit sweeter than most varieties. Maupay is a large, solid, handsome, late sort, having quite a basin around the stem. Early York is somewhat irregular in shape, very early and very productive. Fejee and Lester's Perfected are so nearly alike that there is no distinction worth noting. The fruit is large and very solid. If this tomato were of a scarlet color, and as early as Boston Market, it would be a

standard kind throughout the New England and Middle States. However excellent in every other respect a tomato may be, a purple color is death to its prospect for general market purposes. The Tilden does best with me on low, rich land, where it grows to a large size, fills out well, and its color is of a peculiarly brilliant scarlet. Like the Lester, it appears to be more popular in private gardens than in the public market. The Trophy is the largest of all the round kinds. On my grounds, grown on a large scale, it proves to be as a whole, very symmetrical and remarkably solid for so large a variety. I consider it a tomato of great promise, and know of no other variety that I would sooner recommend for family use or for market purposes. It will not yield in number equal to many other sorts, but then the magnificent size makes all amends. I had a number of clusters this season that had nearly a peck in each.

The yellow and white varieties are closely allied; the white being of a light straw color, and each of these has a sweet flavor peculiar to them. It is somewhat singular that this fact is true of several kinds of berries, among which white varieties are exceptional. White strawberries are sweeter than the red sorts; the same is true of white raspberries, currants, blackberries and I think I may add the white varieties of grapes.

As food for stock, tomatoes should be of a value analogous to apples, as they are closely allied, the acid of each being malic. Cows will eat them ravenously, consuming nearly a bushel of green ones at a meal. I have not seen much increase in the flavor of milk when tomatoes are fed green, and have never fed them ripe. As tomatoes will yield over a thousand bushels to the acre, and are already on the ground, requiring no shaking off, this comparative value is held worthy of a test by experimenters. The large yellow sorts would probably be the best kinds to grow.

Tomato vinegar is largely manufactured in New Jersey, by a patented process, but into which, it may be very safely assumed, sweetening in some form enters. It is said to be very profitable.

Some hue and cry has been lately raised about the tendency of the use of the tomato to produce cancerous diseases. I have as yet seen the name of no reputable physician connected with this theory, and as the acid of this fruit is identical with

that of the apple, I presume the charge would be as reasonable against one as the other.

As regards the cultivation of the tomato, this is so generally understood that hardly more than a remark is required under this head. The tomato will not grow in the open air before the ground has become warm, and all planting earlier than this serves but to injure the plant. They are oftentimes started too early in hot beds, and because overgrown, are spindling before they can be transplanted out into the open air. I would not advise to plant the seed under glass earlier than April 1st, nor to transplant it into the open ground earlier than May 20th. Those planted for an early crop should be put in ground not very rich.

JAMES J. H. GREGORY, *Chairman.*

ROOT CROPS.

ESSEX.

From the Report of the Committee.

The crop of potatoes by Mr. Winkley was one of the new varieties, raised by Mr. Albert Bresee, of Vermont; and known as No. 6, or Peerless. This crop, as will be seen in the accompanying report, was enormous, being at the rate of nearly 422 bushels to the acre. In yield, No. 6 is fully equal to the famous Harrison, while in quality it is much superior; though hardly equal, I think, to its elder brother, the Early Rose. It is remarkable that so heavy a crop should be grown with only the residue of the manure left by the crop of the previous year, to feed on; perhaps this may suggest an improvement over our usual way of manuring the same season we plant, when we have a strong clay loam to deal with; which, as we all know, is very retentive of manure. Perhaps our usual method gives us too much top to the sacrifice of tubers.

In the footing up of expenses, friend Winkley makes the usual error of underestimating his labor. As a farmer I should be loth to take the contract of giving a crop on 128 rods the two hoeings and accompanying weedings it would require, for a

less figure than fifteen dollars. Again, with all the aid possible from modern implements, I could not dig and put into the cellar such a crop, with the picking of it up, which would be involved in the operation, for a sum *less* than fifteen dollars; and with the common method of digging with the hoe, not even for that figure. But I assume that a man who had the enterprise to plant so largely of No. 6 dug his potatoes with more or less aid from the plough. I find Allen's potato digger, which is a modification of the double mould board plough, a capital labor-saving implement, in potato digging. When I first tested it, I feared it would bruise the potatoes badly; but to my surprise it did not on the average bruise one to a cartload. I have had it tested on good loam, on rough, ledgy hillside, and on bog meadow; it did the best of work, and about equally well in each instance. I put two good hands digging beside it on bog meadow, and found that with one person to drive the horses and one to hold the machine, it did the work of twelve men, cutting and bruising next to no potatoes, while the best of diggers will always cut more or less, and some hands a quarter of what they dig; particularly if the potatoes are of large size and long in shape. I had fear lest a large portion of the crop would be covered by the earth thrown up by the machine; but by digging every other row on the piece and teaming them off before the remainder of the piece is dug, there are certainly no more lost, and probably less, than by common hand digging. The implement requires two horses, and can be readily managed by any man who ever held a plough. By careful figuring I found I cleared its cost every two days, when in use. I confidently advise every farmer who grows an acre of potatoes in drills, to buy one of these diggers. The price is sixteen dollars; it can be procured of Ames & Co., and probably other dealers in Boston.

Patrick Kieley raised a very nice crop of ruta-bagas, for table use, which appeared to be of the London Swede variety. I must take issue with him on some of the details of the cost of raising the crop; should not want to contract to plough a half acre of land three times and harrow twice, for less than twelve dollars, and could not spread butter very thick on bread at that price.

The onion crop of Mr. Joseph N. Rolfe was worth going a long journey to see. Of the Danvers variety the strain was rounder than is usually grown, running almost into the "goose egg" shape, a kind that gives the largest crop when you get them ripe; but one safe only in a very dry season, in a wet season failing to bottom down, and giving a large crop of scallions. Mr. Rolfe has a noble ambition as a farmer, and aims yet to raise his thousand bushels of merchantable onions to the acre; but I would not advise him to run this strain of onions; his land is a clay loam, having a sandy sub-soil. I think that a wet season would be more apt to give scallions on such a soil with this strain than a crop of marketable bulbs. The tops of this crop were two and a half to three and a half feet in length, measured as they lay in a dense, dry mass, almost covering the ground. Now every onion-grower knows what would have happened with onions having such tremendous tops, had the season proved a wet one towards its close instead of remarkably dry. To ascertain the quantity of the half acre three rows were taken, the middle row and one at each end. These were pulled and topped on the ground, and then weighed; and the yield as thus determined was at the rate of one thousand and ninety bushels to the acre. As the crop was somewhat green, the onions not being very hard, though the necks were well dried down, the committee arranged with Mr. Rolfe to receive a report from him of the actual weight of the crop when marketed. It will be seen by the report of Mr. Rolfe that the yield of the crop was 970 bushels to the acre. This is a remarkable crop, worth a journey of thirty miles to see. With Mr. Rolfe's figures of the cost of his crop I nearly agree, but shall put the cost of cultivation a little higher. I find Holbrook's Double Wheel Hoe quite an improvement on the common wheel hoe. It can be run much nearer to the growing crop, and thus saves a great deal of hand weeding.

The members of the committee who visited the onion crop of Mr. Noyes, of Middleton, found it to be of superior quality, the onions being of excellent size for market, very hard and well ripened, necks small, with not a pocketful of scallions on the half acre. To determine the amount of the crop, three rows were taken, one at each end of the half acre and one in the middle; these were pulled, topped, and carefully weighed, and assumed

to be the average of the entire crop. The crop of Mr. Noyes was in excellent condition for marketing. I can hardly agree with friend Noyes as to the cost of raising his crop. Adding the cost of topping the onions, I cannot make it figure less than one hundred dollars on the assumption that he used but three cords of manure to the half acre, which I understand is his statement. The great difference between my figures and his is in the cost of cultivation. There are peculiarities worth noting in the management of Mr. Noyes and Mr. Rolfe. Mr. Noyes did not plough his land in the spring, and ploughed under nearly all the manure in the fall. Mr. Rolfe harrowed his manure in. Mr. Rolfe's soil was, as seen by the committee, a clay loam, quite free from gravel at the surface; on such soils, manure could be more safely harrowed in than on lighter soils, as the moisture they retain helps to rot the manure, and thus the surface is not dried so readily as on gravelly soils, to the detriment, sometimes, of small seed, in their vegetating and their subsequent growth. Again, on a wet, heavy soil, in early spring, manure harrowed in just below the surface, serves to underdrain the land of superfluous moisture, and thus favors the vegetating and early growth of seed.

In West Newbury we found ourselves in a community where the art of farming had been handed down from father to son for five or six generations. Back from the farm-house of this generation stand the houses dwelt in by past generations, there being usually three on each homestead, the relics of antiquity doing service as out-buildings. Three or four generations dwelt under the hospitable roof of Mr. Rolfe, from the aged grandfather—aged ninety-two, with all the vigor of threescore and ten yet upon him—to the energetic young man just girding himself to walk in the steps of his ancestor, and maintain the honors of his house. Mr. Rolfe informed us that there had not been a farm sold in the neighborhood as far back as his memory ran. All honor to Newbury Old Town! What a wealth of association rises in one's mind as he looks around on these ancient homes. I would sooner live in a log cabin, surrounded by these associations, than to exist in the finest palace in the land without them. When will our irreverent Yankee mind give an English meaning to that richest of words, "Home"? It exasperates me when men talk of leaving the community

where they and their ancestors before them were born and reared, merely because they may be able to better their condition pecuniarily. Nature oftentimes punishes this irreverence severely. Of the scores of families who have left home from my native town to settle in the far West, in the last thirty years, with barely an exception, all who had sufficient means at command, returned, having realized in their absence that "Home" was more than merely an abiding place.

JAMES J. H. GREGORY, *Chairman.*

Statement of Joseph N. Rolfe.

The half acre of land upon which the onions were grown that I offer for premium, is a dark loam, with a clay sub-soil. It was planted with onions the two previous years. The land was ploughed about six inches deep, the manure was spread on after ploughing, harrowed in with a common tooth harrow, at the rate of nine cords per acre: sowed about the 13th of April, in drills 13½ inches apart, using four pounds of the Danvers yellow seed per acre. The ground was hoed seven times with a wheel hoe, and weeded four times. The crop was pulled the 12th day of September, and topped on the ground. The manure used consisted of a compost of horse, cow and hog manure.

Cost of manure on half acre, ...	$45 00
Cost of preparing the ground, ...	6 00
Cost of seed and sowing, ...	9 00
Cost of cultivation, ...	20 00
Cost of harvesting and topping, ...	20 00

The crop on the half acre, when measured and averaged by the committee, was 545 bushels. The weight, when sold, was 25,220 pounds; making 485 bushels, at the rate of 970 bushels per acre.

Statement of A. P. Noyes.

ONIONS.—The one-half acre of onions I entered was measured by the two members of the committee on root crops who visited my farm. They also measured and weighed two rows that would be a fair average, and estimated that they measured at the rate of 445½ bushels to the half acre. The crop of 1870

was onions, manured with six cords of barnyard manure per acre, spread and ploughed in the fall of 1869, nine inches deep. In the spring of 1870 I spread on about sixty bushels leached ashes, harrowed through with a tooth and brush harrow. Last fall I spread on about six cords of stable manure, and ploughed it in about six inches deep. This spring I harrowed in about three cords of salt sand to the acre. (By the way, I bought this salt sand for muscle bed, and I really think that my land would have been in as good a condition if I had used ten bushels of salt per acre instead, and saved some hard teaming and some money.) I sowed with seed sower about the 1st of April, with Danvers yellow onion seed, at the rate of four pounds to the acre. The ground was hoed and weeded three times. The onions entered for premium were pulled about the 5th of September, and I don't think I had half a dozen scallions in the bed. They were fit for topping in a few days after they were pulled.

Value of manure on half acre,	$35 00
Cost of ploughing, harrowing, etc.,	5 00
Cost of seed and planting,	10 75
Cost of cultivation,	18 00
Cost of harvesting,	12 00
	$80 75

Middleton, Sept., 1871. A. P. Noyes.

Statement of Paul T. Winkley.

Potatoes.—The land on which the potatoes grew which I enter for premium was in grass in 1869, and had been for sixteen years. Last year we put on forty ox-cartloads barn manure, and ploughed in about six inches deep, and planted it to corn in drills for cows when green. The land is what we call clay loam. Last spring it was ploughed about six inches deep and planted with Peerless potatoes, with no manure, in drills about three feet between rows and fifteen inches apart in the drills, cut in pieces with two eyes in a piece.

The crop is 340 bushels, 60 pounds to the bushel, on $128\frac{49}{100}$ rods.

Cost of cultivation and seed :—

Ploughing and harrowing,	$5 00
Planting,	5 00
Hoeing,	10 00
Digging and putting in cellar,	10 00
Three barrels seed, bought in Vermont,	30 00
	$60 00

They were planted April 19. They are late potatoes and should be planted early ; but they are most excellent table potatoes, and great yielders.

NEWBURYPORT, Sept. 23, 1871.

FRANKLIN.

Statement of F. H. Williams, Sunderland.

TURNIPS.—The ground on which my turnips were raised contains one-half acre. The nature of soil is sandy loam; it had been in grass during 1869 and 1870, and mown twice a year. No manure had been used, but a little plaster was sown in the spring of 1870. The fifteenth of July the land was ploughed 6 inches deep, and harrowed; furrows were then turned 2 feet apart, and 8 loads (30 bushels each) of compost from the hog-pen applied in the furrows. These were covered with a tobacco coverer or ridger, a very good implement for the purpose. The seed was sown July 17, in drills 2 feet apart, using the purple top or strap-leaf variety. The seed sower was run upon the ridges, which I think a good plan in raising turnips, as they do better to stand a little above a general level. The plants were cultivated twice, and thinned to about six inches apart. When harvested they filled the entire space. I commenced harvesting November 8. The tops were first cut and then the turnips collected in a cart. This was a second crop, a crop of hay having been cut early in July.

VALUE OF CROP.

80 bushels of turnips for table use, at 40 cents, .	$32 00
200 " " for feeding, at 20 cents, . .	40 00
	$72 00

EXPENSES.

Ploughing, Harrowing and Sowing, . .	$2 50	
Cost of Seed, ...	75	
Manure, ...	12 00	
Cultivating, ...	3 75	
Harvesting, ...	8 00	
		27 00
Net gain on ½ acre, ...		$45 00

PLYMOUTH.

Statement of Albert Thomas, of Middleborough.

TURNIPS.—The land is 40 rods of dark sandy loam, in grass without manure in 1869; in corn in 1870, manured with 9 loads, of 30 bushels each, of manure from the barn cellar; it was ploughed twice, 9 inches deep, in April and May, and once in June, six inches deep, turning under 8 loads of manure, and planted with a seed sower, July 4th, with Sweet German seed, in rows about 18 inches apart, hoed twice with hand hoes, and harvested the first week in November. Product, 11,560 pounds, or 192⅔ bushels, equal to 770⅔ bushels per acre. Expenses: ploughing, $4; manure, $12; seed and sowing, $1; cultivation, $6; harvesting, $6. Total, $29.

The committee say that in one respect Mr. Thomas's mode of farming is peculiar to himself, so far as appears by the statements of other competitors. He believes in, and practices, deep and repeated ploughing of land under cultivation the previous year. His oat field, in potatoes last year, was ploughed twice, 9 inches deep, in preparation for sowing; his potato ground, in corn last year, was ploughed twice, 7 inches deep; and his turnip patch, also in corn last year, was ploughed twice, 9 inches deep, and once, 6 inches.

Stirring the ground frequently, while crops are growing, is admitted by all farmers to be good husbandry. Some of our Irish and German friends, who succeed in raising on their small garden plats very fine crops of their favorite vegetables, work over and loosen the soil every few days throughout the season, with a manure fork or a spade, and they doubtless find their account in so doing. If frequent ploughing before planting is equally beneficial to the succeeding crop, the fact should be known to all farmers, and the practice should be adopted, by all at least who own teams. If it is profitable for Mr. Thomas, it is certainly worthy of a trial by others.

Henry M. Porter, of Halifax, had one-quarter of an acre of dark loam, in grass without manure in 1869, in corn in 1870. It was manured with 5 loads of 30 bushels each, of barnyard manure, 5 loads of similar manure spread and ploughed in, 7 inches deep, in May, 1871, when 25 bushels of leached ashes were spread and worked in with the horse hoe, harrow and bush, in June, and sowed June 27th, with one-quarter of a pound of Sweet German and ruta-baga turnip seed; hoed twice with hand hoes, and harvested October 1st. Product, 9,320 pounds, or $155\frac{1}{3}$ bushels, being at the rate $621\frac{1}{3}$ bushels per acre.

Potatoes.—The committee say Thomas O. Jackson, of Plymouth, planted 120 rods of heavy loam, which was in potatoes and garden vegetables in 1869 and 1870; manured with 36 loads of stable manure of 30 bushels each, in 1869, with 40 loads in 1870, and with the same quantity spread and ploughed in, 8 inches deep, April 10th, 1871; harrowed and furrowed; planted April 13th, in drills 2 feet apart, seed 1 foot apart in the drills, using 12 bushels; harvested the second week in September. Product, 15,452 pounds, $257\frac{8}{15}$ bushels, being at the rate of $343\frac{20}{60}$ bushels per acre. Expenses: ploughing, $6; harrowing, $3; manure, $40; planting, $15; cultivation, $9; harvesting, $21. Total, $94.

Mr. Jackson in his statement says: "Before the potatoes appeared the ground was thoroughly bushed, thereby killing the small weeds. It was afterwards hoed once with a horse hoe, and dressed with hand hoes, and it was once ploughed between the rows and again dressed with hand hoes. The potatoes are the Early Rose, and are of good size and of the first quality,

as they usually are on our heavy soils. On sandy soils, in this vicinity, the yield of this variety is not large, and the potatoes are apt to be watery. My crop is a very good one, partly in consequence of the earliness of planting, the potatoes becoming nearly ripe before the time of the usual August blight."

Albert Thomas, of Middleborough: 80 rods of sandy loam; in grass without manure in 1869; in Indian corn in 1870, manured with 17 loads of barnyard manure; ploughed twice, 7 inches deep, in April and May, 1871, turning in 15 loads of manure; harrowed well and planted May 25th, with 7 bushels of Bulkley's seedlings, in drills 3 feet apart, seed 2 feet apart in rows; manured in the hills, one-fourth with a large spoonful of plaster and hen manure, one-fourth with the same quantity of ashes and hen manure, one-fourth with plaster only, and one-fourth with hen manure only. The best yield was from the mixture of plaster and manure. Cultivated twice and hoed twice. Product, $153\frac{50}{60}$ bushels, being at the rate of $307\frac{40}{60}$ per acre. Expenses: ploughing and harrowing, $9; manure $18; seed and planting, $11; cultivation, $6; harvesting, $10. Total, $54.

Statement of Thomas O. Jackson.

Beets.—Fifty-nine rods of clayey loam, on which potatoes were raised in 1869 and 1870, manured in the former year with 7 loads of 30 bushels each of stable manure, and in the latter with 21 loads; ploughed April 8th, 1871, 8 inches deep, turning in 22 loads of similar manure; harrowed and bushed; planted April 25th and 26th, by hand, using 4 pounds of seed, of the globe mangel wurzel; thinned and hoed twice; harvested October 26th and 27th, by pulling and removing the tops, each basketful being weighed when put into the cellar. Product, 21,637 pounds, or $360\frac{37}{60}$ bushels, being at the rate of $977\frac{56}{60}$ bushels per acre. Expenses: ploughing, &c., $3; manure, $33; seed and planting, $4; cultivation, $4.20; harvesting, $14.50. Total, $58.70.

Mr. Jackson says: "A strawberry bed was first set, in rows three feet apart, and the beet seed planted between the rows, the broad leaves of the beet being a sufficient shade for the young strawberry plants.

The globe variety of mangolds is well suited for a clayey subsoil. The tops are of some value as fodder, being readily eaten by cattle. Mangolds, growing as they do mostly above the surface of the ground, are easily harvested, a slight pull being all that is needed."

STOCK.

ESSEX.

Statement of Francis H. Appleton.

I enter my thorough-bred Ayrshire cow "Maud," 604, for premium. She dropped her last calf Aug. 9th, and has not yet taken bull.

Last winter she was fed on hay and roots; on pleasant days only, was in the yard most of the time. This summer she has been in the field during the day, and at night in the barn or yard; has been fed, night and morning, with either winter rye, oats or corn fodder, cut green. My pasturage amounts to little or nothing, at present.

Maud, 604, calving Aug. 9th, gave during the first ten days of June, as follows:—

DATE.	POUNDS.		DATE.	POUNDS.	
	A. M.	P. M.		A. M.	P. M.
June 1, . . .	8	9½	June 6, . . .	8	9½
2, . . .	8½	9½	7, . . .	8	9½
3, . . .	8½	9½	8, . . .	7½	10
4, . . .	8	9	9, . . .	7½	10
5, . . .	6½	10	10, . . .	7	9½

Total for ten days, 173½ pounds; average, $17\frac{35}{100}$ pounds per day.

During the most of the first ten days of September, Maud was on exhibition at the New England Fair at Lowell, and fell off somewhat in her yield of milk, and no account was kept. She

is now giving nearly nineteen quarts per day. Maud's largest yield has been twenty-two and twenty-three quarts a day.

Maud has won first and second premiums at New York State fairs, among a large competition; and two years has been in the Gold Medal Herd, of same society.

I also enter my two thoroughbred Ayrshire heifers, "Lily Dale," 1475, and "Lassie," 1442, for premium. "Lily Dale" dropped her last calf, Oct., 1870, and is due to calve Oct. 5, 1871. She was bought by me last winter, but did not arrive on my farm until May 6th. Her yield, calving Oct., 1870, during the first ten days of June, was as follows:—

DATE.	POUNDS.		DATE.	POUNDS.	
	A. M.	P. M.		A. M.	P. M.
June 1, . . .	9½	11½	June 6, . . .	8	11
2, . . .	10	12	7, . . .	8	11
3, . . .	9	12	8, . . .	8	11
4, . . .	9	10	9, . . .	8	11
5, . . .	8	11	10, . . .	8½	11

Total for ten days, 197¼ pounds; average, $19\frac{75}{100}$ pounds per day.

During the first ten days of September Lily Dale was dry. She has won first premium at New England Fair, 1871. She has been second at New York State Fair, 1870, and has twice been in Gold Medal Herd at latter society's shows. Her dam is a celebrated prize winner, in Scotland and this country.

"Lassie" dropped her last calf, April 16th, 1871, and is due to calve April 3d, 1872.

DATE.	POUNDS.		DATE.	POUNDS.	
	A. M.	P. M.		A. M.	P. M.
June 1, . . .	10	11½	June 6, . . .	9½	11
2, . . .	10½	13	7, . . .	9½	11
3, . . .	10	12	8, . . .	10	11
4, . . .	11	10	9, . . .	9	12
5, . . .	10	11	10, . . .	9	11

Total for ten days, 212 pounds; average, $21\frac{2}{10}$ pounds per day.

During most of the first ten days of September, Lassie was on exhibition at the New England Fair at Lowell, and fell off somewhat in her yield of milk, and no account was then kept. She is now giving a little over 14 pounds per day. Her best yield has been an average of 25 pounds for two months time.

Lassie won second premium at New England Fair, 1871.

Lily Dale and Lassie have been fed alike since I owned them, as follows:—

Last winter, she was fed on hay and roots; on pleasant days, only, was in the yard most of the time; this summer she has been in the field during the day, and at night, in the barn or yard; has been fed, night and morning, with either winter-rye, oats or corn fodder, cut green. My pasturage amounts to little or nothing, at present.

Believing that I have hereby complied with the requirements, I submit them to your judgment.

I also enter my yearling Ayrshire heifer, "Lady Essex," 1413.

MIDDLESEX.

Statement of John S. Keyes.

Milch Cows.—The Jersey herd I offer contains nine animals: three cows, three heifers and three calves. They were all, except one, raised by me.

1. "Lily"; color, light red and white, with black points. Dropped, April 17th, 1864. Sire, "Don" of the Forbush stock, raised at Bolton, Mass. Dam, "Buttercup," owned by me, of the stock raised by the Barretts of this town. She is seven years old, has had six calves (four heifers), and dropped the last, Sept. 17th. She gave, Sept. 22d, sixteen quarts of milk, which showed in the lactometer $2\frac{3}{4}$ inches of cream, out of 10 inches, or $27\frac{1}{2}$ per cent. She holds out in her milk as near to her time of calving as is safe to permit, and is perfectly kind, gentle and without defect. Will stay in any pasture, either alone or with other cattle.

2. "Clover"; color, dark red, black and white, black points. Dropped May 1st, 1865. Sire, "Don," above-named. Dam,

"Daisy," owned by me, of the E. M Reed stock. She is six years old, has had five calves (three heifers), and dropped her last, Sept. 11th. She gave, Sept. 22d, twelve quarts of milk, which showed $3\frac{1}{2}$ inches of cream out of 10, or 35 per cent. She is the best butter cow of the herd, and makes, when in full flow in June, fourteen pounds of butter in a week. She has no fault, except that she does not give as much milk as the last named.

3. "Pansy"; color, dark red, black and white, black points. Bought by me in 1869, from the Bridgewater stock, imported by the Hobarts of that town. She is six years old, and has had four calves (three heifers), and dropped the last, April 5th, 1871. She gave, May 30th, thirteen quarts of milk, and showed in the test $1\frac{5}{8}$ inches of cream, or 16 per cent. I purchased her because she so much resembled the last described; but her milk does not equal the other.

4. "Maggie"; color, light red and white, with black points. Dropped Sept. 21st, 1869. Sire, "Dandy," raised by me out of "Nora," by "Duke," got by "Don," and both of the Forbush stock. Dam, "Lily," first described in this list. She is two years old, and dropped her first calf, Sept. 1st (a heifer). She gave, Sept. 22d, eight quarts of milk, which showed 2 inches of cream out of 10, or 20 per cent. She is very gentle, and made no more trouble at the first milking than any old cow.

5. "Essie"; color, light fawn and white, with black points. Dropped March 20th, 1869. Sire, a Jersey bull, owned by J. H. Bent, of this town. Dam, "Nora," bought of J. Forbush, and bred by him out of imported stock (Motley's). She is with calf by "Doctor" (a son of "Clover"), now owned by S. H. Pierce, Esq., of Lincoln, to come in next March.

6. "Flora"; color, dark fawn and white, with black points. Dropped June 10th, 1870. Sire, "Middlesex," raised and owned by Geo. Keyes, of Concord, out of the E. M. Reed stock. Dam, "Pansy," described in this list, No. 3.

7, 8, 9. Three heifer calves, dropped this month, September, by the three above-named, Nos. 1, 2 and 4, and sired by the bulls last mentioned.

My herd is kept at pasture in the summer on rather a light, sandy soil, which starts early, and furnishes some June and witch grasses in the first part of the season, but dries up later, when the milch cows get green fodder, corn and rowen, night

and morning. This year I fed them on large cucumbers, cut up, and one quart of meal to each cow, sprinkled over the mess, during the first part of September; but except this they get no grain while they are at pasture. They are tied up at night, and get a little hay in the barn, when they are not full; but no grain of any kind is my rule while they graze. I made an exception this year, both because grain is cheaper than hay, and for fear that so much green fruit might affect the quality of the milk. When the test of the milk was made, Sept 22d, they were in a scant pasture, and had only the single quart of meal daily that I have stated.

The heifers were in the pasture from May to November, without any other feed. In the winter I feed the young stock chiefly on rowen, and give the milch cows as much English hay as they will eat in the morning after milking; then water, in the barn if stormy, and in the yard if pleasant, leaving them out an hour or two. At noon, tie up and feed a mess of cut stalks or meadow hay, with a quart of cob meal to each cow, using the stalks in the first part of the season, and the meadow hay, which has some blue joint and swale grasses in it, later in the season. At night, after milking, give them a feed of roots, mangolds or turnips, and a shake down of swale hay is put before them at bedtime to pick over, and the refuse is used for their bedding. I try to keep them comfortable by warm stables, clean bedding and carding every day; but I do not feed high, and I care more for quality than quantity of milk. The milk is not sold, but made into butter for the family use, and the skim milk is given to the calves, which I have almost always raised. These I feed for the first month on new milk, teaching them to drink it from the pail as soon as the cow's bag is all right; after that I give them skim milk that has stood twelve hours only for cream, warmed up to blood heat; then, rowen or grass, as soon as they will eat it, without any grain, till they come in with their first calves. I have never lost but one in the six years I have practised farming, and I mean always to keep them growing; but for some years, when I have let them go into the country, I have not succeeded, and now propose only to raise what I can feed at home. I have stated, above, the quantity and quality of their milk, but the largest amount of butter, per week, I cannot give, or the average, as we do not sell it or weigh it, and we use cream

very freely in the family. In the winter the butter comes of a good color, and seldom with any trouble in churning. Occasionally the milk will seem to be composed chiefly of caseine, and for one or two weeks no butter can be made of it, and this, without any change of food or treatment of the cows. I am disposed to attribute it to some internal change, occasioned by the state of pregnancy of the cow, but must experiment farther.

The qualities I claim for my herd are, that they are a sensible mixture of several strains of the imported Jersey stock, chiefly of the Reed and Motley importations. They are strong, healthy, hardy animals. In six years I have lost but one cow and one calf, and have raised nearly twenty. Of the bulls, the first one I raised took the first premium at this exhibition in 1866; and the one now owned by S. H. Pierce, Esq., of Lincoln, is a good specimen. The cows give good messes of rich milk, hold out well, and are gentle and kind. If they are not as "fancy" as some Jerseys, nor as "high bred," they are not as delicate, do not become barren, and will do well on common keeping; they are adapted well to our soil and climate, and to the wants of that class who desire a family cow, to use the milk, not sell it, and make their own butter. As to the profit, I have never kept an account with them. I raise all they consume, and consume all they produce, except selling enough of the yearlings to pay a good interest on the investment. I think "they earn their keep."

Statement of Hammon Reed.

GENTLEMEN:—I offer for your inspection, in competition for the society's premiums offered for herds of cattle, six pure-bred Ayrshire cattle, named as follows: bull "Lexington," four years old; cow, "Miss McGregor," nine years old; cow, "Bessie," eight years old; cow, "Rose Standish," six years old; cow, "Daisy," six years old, and the cow, "Gentle, 2d," four years old.

The average quantity of milk given by "McGregor" for one week in June was 24 quarts per day; "Bessie," 23 quarts; "Rose Standish," 21 quarts; "Daisy," 20 quarts; and "Gentle, 2d," having been milked more than a year, 10 quarts. She gave for seven days in June, 1870, an average of 17½ quarts per day. The last week in August, "McGregor" gave an average

of 20 quarts per day, and "Bessie" an average of 18½ quarts per day. The milk is sold at the barn. At the time of trial in June the cows had pasture feed alone; in July commenced feeding corn-fodder in addition; and since the first of August they have had three quarts of shorts and one of corn meal, in addition to corn-fodder and pasture feed. In the winter I feed hay dry, with from four to six quarts of shorts and two quarts linseed meal, dry, and a peck of roots to each cow. "Lexington" has been fed in the barn through the year on second quality of hay, with two quarts of corn meal per day. He is quiet, easily managed and an excellent stock getter.

The superior qualities claimed are an extra quantity and quality of milk produced, considering the amount of food consumed, and their peculiar adaptation as a breed, for dairy cows on the farms of New England which furnish milk for the market. While they are naturally quick and high-spirited, I have found no cattle more easily controlled and managed by gentle and careful handling than the Ayrshire.

Annexed are their pedigrees:—

"Lexington" (A. H. B., No. 673), bred by George W. Lyman; sire, "Comet"; dam, an Ayrshire cow; both imported by Mr. Lyman.

"Miss McGregor" (A. H. B., vol. 2, No. 641), bred by J. Giles, Framingham; sire, "Rob Roy, Jr.," out of Ayrshire cow, by "Rob Roy"; both imported by Sir James Logan, Montreal, C. E.; dam, "Lady Mary" (A. H. B., vol. 2, No. 536).

"Bessie" (A. H. B., vol. 2, No. 263), bred by J. Giles; sire and dam same as "McGregor."

"Rose Standish," (A. H. B., No. 752), bred by H. Loring; sire, "Malcom," No. 254, out of "Miss Morton," No. 153, by "Eglinton," both imported by H. H. Peters, Southborough; dam, "Myrtle," No. 649, out of "Queen, 3d," No. 182, by "Eglinton, 2d," both imported by Mr. Peters.

"Daisy:" sire, "Granite State," out of "Gentle," No. 83; grandsire, "Johnnie," No. 34; dam, "Coulant de Lait"; granddam "Gentle," No. 83, (A. H. B., No. 1231).

"Gentle, 2d," bred by W. H. Crawford, Chester, N. H.; dam and sire same as "Daisy."

HAMPSHIRE.

From the Report of the Committee.

Everywhere we observe the influence of the pure breeds mixing together and blending the peculiar excellences of each with the constitutional vigor and practical self-helpfulness of the native. Everywhere we see promise of a class of cattle, "native and to the manor born," which in varying proportions, and according to the wants and conditions of different individuals and sections, shall unite the size and symmetry of the Durham, the deep milking qualities of the Ayrshire, the docility and plumpness of the Devon, and the inherent faculty for butter making of the cattle from the Channel Islands and Brittany.

After as careful examination and as deliberate consideration as time and the weather would admit, your committee have awarded the first premium to Mr. Watson, and the second to Mr. Hibbard.

There were twenty-six entries of heifers of the leading breeds and their grades. Every one of these young animals was deserving of high commendation, and collectively they bore eloquent testimony to the growing interest in stock breeding. In numbers, the Shorthorns and their Grades took a decided lead; while the Ayrshires, Devons, Jerseys, and Guernseys, although fewer in number and less in size, were equally remarkable for excellence in the distinctive properties of their respective breeds.

Among so many beauties, it is a disagreeable task to particularize. Suffice it to say, that unmistakable promise of superior milking qualities, united with large size and perfect symmetry, the result of generations of skilful breeding, generous feeding and unremitting care, decided us to award the first and second to the Shorthorns of Messrs. Judd and Bates. The third premium was awarded to Mr. Chase, for the beautiful Ayrshire heifer Cora 2d. The fourth to Mr. Edmund Smith, of Hadley, for a very large Grade heifer of singular quality; and the fifth to Mr. Bates, for a yearling Shorthorn of surpassing beauty and promise.

No premiums were offered for heifers over three years old; but the extraordinary merit of Empress 3d and Yarico Beauty, exhibited by Mr. Judd, induce us to commend them to the executive committee, as fit subjects for special premiums.

Conscious of an honest intention and diligent effort to do justice to all, your committee cannot and do not expect that their awards will give universal satisfaction. They would therefore repeat that the entries were numerous and of unusual merit, that their time was limited, and that the weather was singularly unfavorable for deliberate examination and critical comparison. They also feel satisfied, from the personal character of the exhibitors, that all feelings of disappointment, if such there should be, will be forgotten in hearty, public-spirited rejoicing that so fine a display of stock should be brought together at Amherst, to attest the skill and energy of the farmers of Hampshire County.

In addition to the award of premiums, it has become the custom to expect from the committees a few remarks pertinent to the matters assigned for their consideration. In trying to perform this part of our duty we may often seem to state our opinions as facts. Such arrogance is quite unintentional; we therefore beg the reader to supply "we think," or "it is our experience," where such qualifications are omitted from a necessary regard to brevity.

We are often asked, "What is the best breed of cows for profit?" There are good, bad, and all intermediate qualities, of all breeds. Still a consideration of the circumstances under which, and the purposes for which, the leading races of cattle have been bred for a longer or shorter time, will materially aid us in deciding whether animals of this or that breed are adapted to our circumstances, and calculated to fulfil the objects we have in view.

For symmetry of form and beauty the high bred Shorthorns are unrivalled. In quality or the capacity for profitable production of beef and milk, there is a wide difference between individuals and families of this breed. The Shorthorns are said by some to have originated from a cross of Dutch bulls on the native cattle of the north of England. From this mixture, and in the hands of skilful breeders, who aimed at the improvement of stock for practical purposes, a class of Shorthorn cattle was established, about the end of the eighteenth century, which united in an eminent degree the character of great milkers, quick feeders, and of attaining to great size. Attention being called to these qualities by the Messrs. Colling and others, the

Shorthorns have since commanded very high prices; and have, to a great extent, been kept by comparatively inexperienced parties, as mere fancy stock, and have been bred for sale, and without any care to develop or even to retain their useful properties.

At the same time, many gentlemen, and some ladies, of good judgment and ripe experience, have successfully exerted themselves to retain and improve, the noble qualities for which the breed has been so highly esteemed. The results of these widely different courses is, that while some families of Shorthorns continue to give a large flow of rich milk till far advanced in pregnancy, and display a remarkable tendency to lay on flesh, others cannot even suckle their own calves, and are only kept in show condition by extravagant and unprofitable feeding.

The Ayrshires are a breed of dairy cattle which appear to have originated from a cross of the Shorthorns, at the time when this race was more generally distinguished for milking properties, on the original stock of the county of Ayr. They have also been credited with an infusion of Jersey blood, and this supposition appears to be borne out by the light stripe round the nose often noticeable in Ayrshire calves.

Whatever their origin, the natural result of judicious breeding and selection for purposes of practical utility, for nearly a century, has been to establish a race of cattle which for yield of milk, in proportion to their size, are absolutely unequalled.

As might be expected from their mixed origin, and the somewhat unsystematic way in which they have been bred, we find a great diversity in the form and general appearance of the Ayrshires. There is, however, a striking uniformity in those qualities for which they are chiefly valued. Most good milch cows have big bellies to hold the material for filling big udders, and to obtain these materials in most of our New England pastures requires a high order of energy, muscular activity and endurance. In these qualities the Ayrshires are preëminent. They are essentially a working class, and ten of them will keep in fair condition and yield a good mess of milk in pastures where five larger and lazier animals would almost starve to death. The same hearty appetite and vigorous digestion which enable them to secrete large quantities of milk, are readily diverted to the formation of flesh.

As a class, the Ayrshires are somewhat under the average size. They are usually allowed to come in at two years old, and from that time until they are dried up for fattening, they are subjected to a severe and constant strain on their powers in the production of calves and milk. By liberal feeding during their youth, and by allowing their system a longer time for development, they are readily brought to a full average size.

The Devons are a race of cattle which have existed without adulteration or mixture with other breeds from time immemorial. They have been much improved by careful selection, but the efforts of breeders have been directed chiefly to developing symmetry, aptitude for fattening, and early maturity, with little or no regard to their milking qualities. Their milk is very rich, and the butter made from it is of very superior quality; but in the quantity yielded there is a wide difference in individuals and families. By judicious selection and skilful treatment, a class of milking Devons might doubtless be created which for satisfaction and profit could scarcely be equalled. Probably this has already been done; but of the race at large the distinctive merits appear to be extreme docility, quickness and endurance as working cattle, uniformity of appearance, symmetry, and a remarkable aptitude to fatten on moderate keep. This latter quality is indicated by a certain mellow elastic feeling of skin and hair; and in this property, called "handling, the Devons, as a class, are unrivalled.

The Herefords resemble the Devons in many of their essential features, while they approach the Shorthorns in size. Bred chiefly for beef, their milking qualities are variable and unreliable.

The Jerseys are a race which, time out of mind, have been bred on the Channel islands for the production of milk for butter-making. In appearance they support the Darwinian theory, by forming a link between the ox and the deer. The calves especially, if starting up suddenly, amid suitable surroundings, might easily be mistaken for fawns. The properties for which these cattle are valued, are a peculiar grace and beauty,—which, however, are apt to commend them to ladies and amateurs, rather than to practical stock-breeders,—and exceeding gentleness, and fondness for being petted, a remarkable faculty for converting fodder of all kinds into a very buttery milk, and

last, but not least, such a habit of holding out in their milk, that though their highest daily yield is exceeded by cows of some other breeds, there are but comparatively few which, take the year round, will give a better return for the food consumed.

The Jerseys, like the Ayrshires, are, as a breed, under the average size. The cause and remedy for this have already been suggested.

The Guernseys are somewhat larger and coarser, but closely resemble the Jerseys in their essential features.

The Brittanies are a breed of small black and white cattle, recently introduced by Charles L. Flint, and which appear to unite in a singular manner many of the best qualities of the larger breeds; the symmetry of the Shorthorn, the milking qualities of the Ayrshire, the gentleness and capacity for butter-making of the Jersey, are all presented in such a condensed form, that "Empress," at three years old, in high condition and with calf, weighed only four hundred pounds. This dwarf habit will, however, probably disappear under favorable conditions of food and shelter. The bull Upton (a son of Empress), presented to the Agricultural College by W. Knowlton, Esq., is now six months old, and weighs 384 pounds only in good condition. He is a perfect model of symmetry and courage.

Of the breeds which have been introduced, but which are not known to have made any appreciable mark on American stock, we may enumerate the Swiss, imported by Mr. H. M. Clark, of Belmont, in November 1860, a striking-looking and probably useful race of dairy cattle; the Kerries which seem to possess many of the good qualities of the Brittanies, but lack in symmetry and uniformity of appearance; and the Galloways, whose specialty appears to be hardihood, and ability to produce excellent beef in cold and exposed situations.

With this brief glance at the distinctive characteristics of the several breeds, we pass to the question, "*In what respect are thoroughbred animals superior to natives and grades?*" Chiefly in the ability to reproduce themselves when mated with animals of their own breed, or to stamp their distinctive excellences with peculiar force on the robust constitutions but unsettled tendencies of the mixed breeds. Indeed, an especial mission of the pure breeds appears to be the production of bull calves;

and they often pursue their vocation with a fidelity extremely disgusting to their owners.

The qualities of a good milch cow are patent and unmistakable; and if such an one be coupled with a bull of pure milking race, her progeny will rarely disappoint the reasonable hopes of the breeder; but if a grade bull be used, the progeny will, like as not, resemble a scrub ancestor, raised because his mother could not fatten him, and used because his services could be obtained at the lowest possible rate. We once bought a handsome and excellent grade cow, with calf by a good-looking grade bull; and, allowing for a little poetic exaggeration in the matter of the dewlap, the produce was a literal copy of Virgil's portrait of a stock cow. For breeding working cattle, says Virgil, "the best form is that of the fierce looking cow, with coarse head, and thick neck, and dewlaps hanging from her chin to her shins. Her side immoderately long; all her proportions are massive, even her foot, and her shaggy ears under inbent horns. All the better if she be streaked and spotted with white, or fractions, or ugly with her horns, and more like a bull in the face, and pretty hateful generally, and she sweeps the ground with her tail as she steps along."

Our heifer proved utterly worthless for milk, but some of the neighbors thought she would breed splendid oxen.

While advocating the use of pure-bred males, we would emphatically denounce the idea that all animals of a particular breed are of equal merit, or that a herd-book pedigree is of itself a satisfactory proof of a bull's fitness to perpetuate his race. The best systems are liable to abuse; and many a miserable, rickety calf is raised because it is thoroughbred, which, if only a grade, would meet with a fate more in accordance with its deserts and the interests of the community.

Such animals are constantly to be found in the hands of characterless jobbers and inexperienced fanciers. Nobody keeps them long; but, as they will usually command a price somewhat above their value for beef, they are passed from hand to hand, to multiply their infirmities, and to bring disgrace on the breed to which they pretend to belong.

Another evil resulting from the breeding of pure-bred cattle for sale, is the practice of letting the calf suck its dam for a shorter or longer period, after which the cow is suffered to dry

up, to keep her in show condition, and for the benefit of the succeeding calf. This inevitably diminishes the milking capacity of any cow, and, if persevered in, must reduce even the best milking race to the normal condition of only giving sufficient milk for the temporary nourishment of its offspring. In selecting stock for milking purposes, it is therefore important to consider, not only the breed, but the individual qualities of the animals and their immediate ancestors, and also the treatment to which they, respectively, have been subjected, as far back as this can be ascertained.

This in a measure accounts for the very different prices which animals, apparently of equal merit, command, according to the skill and reputation of their owners. One man's name is a guarantee of a long succession of the best blood, without blemish or imperfection; while another stamps every animal which he owns as defective in quality or descent, or both.

Mr. Augustus Whitman, of Fitchburg, furnishes a fitting illustration of the former class of breeders; and the energy and system which he brings to bear on all his undertakings, well deserve admiration and emulation. Notwithstanding that his movements are impeded by severe chronic lameness, he ably superintends a very large manufacturing business; and for relaxation devotes an amount of thought and attention to the breeding of improved stock which would in itself severely task the powers of a mind less vigorous or less evenly balanced. Unlike the man who had such a big pile of wood to cut up that he could not stop to have his saw filed, Mr. Whitman is never hurried or fretted by his work, and his herd of Shorthorns are just what such a man might be expected to own. Starting with the conviction that a union of great milking capacity with the properties of symmetry, early maturity, large size and quick feeding is possible and desirable, he has brought to bear both skill and capital to illustrate his theory; and he has now confessedly the best herd in New England, while he is doing much, very much, to diffuse correct ideas on the subject of breeding. Fully recognizing the two important axioms, that like produces like, and that, especially for purposes of reproduction the best is always the cheapest, Mr. Whitman has filled his stalls with worthy representatives of the best herds in the country, and a

like judicious liberality is perceptible in his selection of assistants to whose care these valuable animals are entrusted. But the feature in Mr. Whitman's management to which we wish especially to call attention, is the thorough, business-like record which he keeps of all matters relating to his stock. Their marks, age, pedigree, couplings, produce from first to last, and, what is most unusual, the quality, composition and cost of their food, and their daily yield of milk, are all systematically recorded, and can be instantly ascertained and precisely stated. The value of such a register for a breeder's own guidance, for the satisfaction of purchasers, or for the information of the public, can scarcely be overestimated.

Mr. Whitman's partner, Dr. Miles, has a large herd of Ayrshires; and the quality of his herd, and the fullness and precision of his statements, clearly show that his management is characterized by a like methodical care and good judgment.

To turn from these pleasant pictures to examine the practice of Messrs. Gammon, Snap and Co., is no agreeable task; but the illustration of our subject requires it.

In the purchase of stock their first requisites are cheapness and a pedigree. They have lots to say about the aristocratic lineage of their herd, but it is usually difficult to trace the family likeness, and in the pedigrees there is often a lamentable hiatus of a generation or two, bridged over with animals bred no one certainly knows how or by whom. If the cows are with calf, and you ask the date of their service, Michael is appealed to, and, after mature consideration, fixes the period by reference to an interesting circumstance which occurred about a fortnight or three weeks before Owen Flannigan's wake; but whether this latter occasion was celebrated in March, April or May, is more than "the body o' me knows." The calves are coarse, or rickety, or feeble, or deformed, and even if some of them look plump and fat, their condition is no credit to their dams, whose milking qualities are evidently of the most meagre character. The bull and heifer calves run together till the impropriety of their doing so is very fully proven. A discreet silence is observable as to the character and fate of the earlier produce of the cows, but the neighbors say that their first progeny were sired by a scrub bull which shared their pastures. In short, on every side, we may observe marks characteristic alike of the

cattle and their owners. Mean shapes, coarse heads, broken noses, harsh wiry hair, hard thick hides, vicious tempers, chronic tendencies to abortion, poor milkers, defective udders, and ignorant and brutal attendants, tell unmistakably of want of judgment, niggardliness, and unprincipled dealing.

Between the two classes we have described, there are numberless gradations of skill and honesty and their opposites; but we are satisfied that the market reporter's stereotyped comment, "the price depends mainly on the fancy of the customer," applies with far more force to the lower than to the higher class of thoroughbred cattle.

A growing pile of manuscript warns us that our hobby has carried us far beyond the usual limits of a report. We cannot, however, leave this subject without expressing our conviction that the ability to yield an abundant supply of good milk is a prime requisite in a cow for New England; that a superior faculty for milk is by no means incompatible with an equal aptitude to lay on flesh when dry; but that the two are often united in animals of healthy constitutions, hearty appetites and good digestions; and, lastly, that the milking faculty is found in individuals of almost every breed, and by judicious breeding and skilful treatment may be rendered a fixed and reliable property, without the sacrifice of any of the valuable qualities for which the several breeds are at present esteemed.

Small space is left for the important consideration of the treatment of stock. Fortunately this may be summed up in a few words. Good and abundant food, comfortable shelter, proper ventilation, regularity in milking and feeding, cleanliness, and kindness, these six; but the greatest of these is kindness. The charity on which Paul insists in his letter to the Corinthians, "for which sarch the Scriptures, and when found make a note of it," is only another name for the kindness we would urge on all in their intercourse with domestic animals. To attain the highest degree of satisfaction and success in the management of stock, requires a careful study of the nature, wants and condition of animals which comparatively few think it worth while to exercise. Many seem to think that, by providing food and shelter for their stock, they are entitled to an abundant return in money value, and also an implicit obedience to demands which are opposed to an animal's natural instinct

and inclination, and which they (the owners) do not trouble themselves to adapt to the animal's comprehension. Failing to obtain this, they appear to regard their stock as a lot of rebellious subjects, ever seeking to thwart their reasonable wishes, and only to be controlled by harshness and severity. Now this is all wrong, and is productive of serious loss and vexation to owners, as well as detestable cruelty and oppression to the poor brutes.

The fundamental principle in Mr. Rarey's theory, that *a horse will not offer resistance to any demand which he fully comprehends, if made in a way consistent with the laws of his nature*, applies with equal force to almost all classes of domestic animals. Cows, especially, appreciate and repay kindness and sympathy in a way which none but those who have studied their conduct and disposition can fully understand. They will answer to their names, come when they are called, submit to be handled or examined, and welcome the approach of a kind and gentle attendant by unmistakable tokens of pleasure and affection. Nay, more, they will submit to an almost incredible amount of pain rather than to hurt or disturb those whom they believe to be solicitous for their good. We have often been called on to milk cows whose teats have become sore from accident or neglect, but we have rarely known them to resist, even when the blood has oozed at every pressure; and in more than one instance, when from excess of pain it was impossible for a cow to stand perfectly still, we have observed an evident and affecting care and anxiety to avoid treading on or hurting us, which we can only account for on the supposition that the suffering creatures understood and appreciated our sympathy and efforts.

Considerations of humanity and self-interest alike urge us to an application of the golden rule in our relations with domestic animals. The time is past when the rod was regarded as an indispensable aid in the education and discipline of human beings, and the sooner the whip is banished from the barn the better, both for the farmer and his cattle; and we shall conclude our o'er long essay with a few rules, which we have practised with much satisfaction, and which we can therefore confidently recommend.

Never strike a cow when you are excited or cross; because,

on reflection, you may find that you, and not the cow, were in fault.

Never strike a cow for doing as well as she knows how, even though that may not be exactly what you wish. I have seen men change a cow's place in the barn, and then beat her savagely because she did not go to the new place, instead of the one she had been taught and accustomed to go to.

Never strike a cow with a view to teaching her anything; because fear and excitement only render her more incapable of comprehending your wishes; and because, in ninety-nine cases out of a hundred, a cow has not the remotest idea what she is struck for, and therefore the only effect of the blow is to provoke a desire to escape from further abuse; and failing that, a desire to retaliate in self-defense.

Considerable experience and careful study of the actions and dispositions of cattle have satisfied us that the safest plan is never to strike a cow at all; but if you must strike,

Never strike with any other weapon than your naked hand; because you will thus be enabled to form a pretty correct idea of the bodily pain you inflict, and be more likely, than you otherwise would be, to know when to leave off.

JOHN C. DILLON, *Chairman.*

BRISTOL.

From the Report of the Committee.

Among the subjects of highest importance to a New England farmer, is his farm stock. A good manager considers his cattle as so many machines for converting raw material into milk or beef, as required, and the animal that makes the greatest returns of either is the best.

So long as the pastures in sections of our Western and Southern States rival those of Bashaw, and their grain fields are like Egypt in the years of plenty, only more extended, and so long as to save fencing they raise their calves to bring their milky mothers home at night, the stock raisers of the East will have to turn their attention principally to dairy products for profit. Such being the case, the natural inquiry is, What breed of cattle has the best qualities for the Bristol County farmer? The ancestry of what is called our native breed were principally

imported from England, though from what part seems uncertain. Some Dutch cattle were brought to New York, the Swedes carried a few to Delaware, while the records of New Hampshire show the importation of cattle from Denmark by a Danish colony. Quebec received cattle from Normandy. In process of time, it is probable, these different breeds have all been commingled, spreading throughout the United States.

The New England Colonies were most painstaking, and succeeded in retaining better qualities among their flocks than is shown by the stock of other States, perhaps aided now and then by the bringing over of some pure-blooded animal from the fine herds of England. However, not much was done to improve the stock by importation until within fifty years, though now almost any farmer has an opportunity of introducing good blood among his cattle. The question to be answered by each stock-raiser for himself will have reference to the qualities of the different breeds, as which is easiest acclimated or which points are best suited to his farm and market facilities. The Jersey cow commands the highest price in the market, if we judge from the amount she brings at the public sale of cattle at different times, and we witness marks of that blood in many of the flocks scattered over the hills and valleys of the State ; they are represented as profitable to keep for making butter, and many of them are good milkers. The Ayrshires are becoming popular in many localities, being a hardy race, well adapted to our climate, excellent milkers, and make good butter, also profitable for farmers to keep. Devons and Shorthorns are kept to some extent pure, but mostly to cross with other breeds ; a cross of the Shorthorn bull with a Devon cow produces a fine animal.

Many of our farmers consider grade cows more profitable to keep than thoroughbreds. But let us remember that food and management have as much to do with a good cow as breed ; that a well-fed and well-cared for animal pays far better than a cow suffered to run down through the winter, and coming out in the spring, with just strength enough to live it through. Give her proper food and attention, and she will repay you.

During the present century great progress has been made in developing the good qualities of the cow. Fifty years ago, a cow that gave 1,200 quarts of milk a year was considered by many a good cow. Perhaps even now a large proportion o

the cows in the rural towns in Bristol County do not give an annual yield of over 1,600 quarts; we should not be satisfied with a cow unless she gave 2,500 quarts or over in a year; better still if, by more liberal feeding, we can have one that gives 3,500 quarts. This may look a large yield to many, but we have reports of cows in the State as giving over 4,000 quarts a year.

If we examine the profit of different cows, we find that the cow giving 1,200 quarts, at 5 cents a quart, produces an income of $60 a year, which hardly pays for care and keeping; the one that gives 2,500 quarts amounts to $125; while 3,500 quarts amounts to $175, leaving a net profit over the first of $115 while the extra feed amounts to but a small part of the increased income.

That the farmers of Bristol County are awake to their own interest, is evinced by the gradual improvement in their stock shown at our annual fair, there being a show of stock superior to that exhibited in former years. There were five entries of herds of cows, twelve entries of milch cows, nine entries of milch heifers, fifty-six entries of heifers; all the stock entered were on exhibition, except two heifers. Among those on exhibition of particular merit was a flock of ten Jersey cows and heifers, exhibited by Henry S. Freeman of Norton, showing the superiority of careful breeding and proper care of an animal to a careless and indifferent mode of treatment; also, another flock of fine Ayrshire cows and heifers, entered by F. L. Ames, of Easton; two grade milch heifers, one by E. P. Woodward, the other by Willard Tripp, of Taunton, and a number more of hardly less merit, together with a number of excellent native milch cows. Another marked feature in the animals shown, was the great number of grade heifers, a cross of the Ayrshire with the Jersey, Ayrshire and Jersey with the native, also other crosses not less important, showing the tendency of farmers to change the quality of their stock.

AUGUSTUS LANE, *Chairman.*

PLYMOUTH.

From the Report of the Committee.

After inspecting the ponderous beef cattle, the quiet cows and the muscular bulls, an unthinking spectator might be inclined

to turn from the motley collection of thin-necked, long-legged heifers, as hardly worthy of a moment's attention. But he who deems this part of the exhibition unimportant, or even unattractive, must be indeed unthinking. It is true that more noteworthy specimens of bovine excellence, measured by popular standards, may be found among the other classes named than can be found among the heifers; but it is mainly among the latter we must look for any assurance of the future improvement of our county stock.

In this belief we visited the pens on the day of exhibition, and found there, awaiting examination, twenty-four heifers, all of which were in our opinion worthy of exhibition. Had the number of premiums at our disposal been eighteen, instead of nine, we should have awarded them all without hesitation, even although some of them might have been awarded for animals not fully up to the recognized standard of perfection.

The description given on the entry lists seemed to us, in some instances, objectionable as lacking definiteness. It is the policy of the society to encourage the breeding of pure stock. If, in some cases, premiums may be awarded for grade animals for special uses, as, for instance, to a cross of the Jersey and Ayrshire for dairy purposes only, the precise character of the grade should be known before an award can be understandingly made. The statement of a competitor that his heifer is a "grade," a "grade Jersey," or a "grade Ayrshire," conveys no definite information as to her promise or pedigree.

Since the word "native" has been discarded from the nomenclature of breeds, the word "grade" has in many cases been made to do duty in its stead. Used by itself, without qualification, it has come to mean any mixture of pure blood, recent or remote, with any other blood, pure or impure, in any proportion, known or unknown. The claims of a heifer so described to consideration in the award of premiums, must, in the nature of the case, be somewhat questionable. When, on the other hand, a heifer is known and entered as a cross of distinct breeds, in specified proportions, the committee have some data from which to calculate the probable value of the result.

We fear farmers have not as yet all learned that the largest heifer, of a given age, is not necessarily the best. Neither do much fat, large bones or thick muscles indicate special excellence in a

heifer intended for a milch cow. The purity of the blood, the fineness of the hair, the color of the skin, the expression of the eye, the form of the head, the size and position of the teats, and various other points, are entitled to consideration before mere weight and girth.

We have put first of all in the foregoing list, purity of blood. The use of scrub bulls has been in the main discontinued, principally because of the comparatively small number of bulls required for a given territory, and the consequent readiness with which the demand can be supplied. But the belief is still quite common that great improvement will result from the use of full-blooded bulls, with the best grade or native (scrub) cows; and during the existing scarcity of cows of pure blood, the practice growing out of this belief must be tolerated as a necessary evil. But the result in any instance will be a mere matter of chance, possibly satisfactory, probably far otherwise. The future excellence of our stock will be assured beyond peradventure, only when heifers of pure blood shall alone be deemed worth raising as breeders.

Pure stock, however, is not always and necessarily more profitable as farm stock, than that which has neither pedigree nor strain of improved blood, individuals of the latter class being sometimes stumbled upon, whose profit and loss account will compare favorably with that of any others, of any line of descent. The superiority of the former consists mainly in the certainty that its peculiarities will be transmitted from generation to generation; so that stock breeders may confidently rely upon securing and perpetuating, as the result of their care and labor, any desired qualities in their herds If they would produce milk abounding in cream, or butter so yellow that even saffron would not tinge it, they may safely invest in Jerseys. If the value of milk to them is determined by the quart measure, instead of the lactometer, they may raise Ayrshires. For oxen, their choice may be the Devons; for fat sirloins, the Durhams. But in either case they must be sure of the purity of both sire and dam, or grievous disappointment may follow.

Through the process of "natural selection" the monkey may have descended from the tadpole, and man from the monkey; but natural selection is not to be recommended for producing

or perpetuating improved breeds of cattle. A little "artificial selection," rigidly enforced, will prove far more effectual.

The rapid increase of improved stock, and its general acceptance by farmers for farm use, may have been unwittingly hindered by the advocates of such stock, themselves. It is not difficult to convince an intelligent farmer of the superiority of such stock; and without special reasons to the contrary, he may accept as true the assertion, too often made, that "it costs no more to raise a full blood than a scrub." But when he attempts to purchase thorough-bred animals, with a view to a "new departure" in stock keeping, he finds the price so out of proportion to the cost of raising, as previously represented, and so out of proportion, in his estimation, to the intrinsic value of any stock for farm use, that he at once concludes that the whole argument is prompted by self-interest, and that no one can afford to purchase except for speculative purposes. If not given to speculation, he will fall back upon his mongrel breeds, which, if not very profitable, can at least be bought and kept for something less than a small fortune.

The truth is, it does cost more to raise good animals than to raise poor ones,—more for siring, more for food; more care, and greater painstaking,—and their advocates might well admit the fact. But the extra cost of raising is not sufficient to warrant the extra prices demanded. The seller's price for a full-blooded Jersey cow, at four years old, will be some four, five or six times the cost of a good native (scrub) cow. At say twelve years old, the native will be worth as much for the butcher as the Jersey; the former, perhaps, seventy-five per cent. of her first cost, the latter not more than twelve or fifteen per cent. The Jersey cow cannot, then, claim even an equality with the native, in point of profit, unless the net income from her dairy products has exceeded the net income from the similar products of the native cow, by a sum equal to the difference in their first cost, the interest on that difference and the extra cost of keeping, leaving out of the account the calves of both; because, if fed for the butcher, the calves of the native will be worth quite as much as those of the Jersey; and if fed for raising and a market, the transaction becomes speculative stock raising, instead of legitimate dairying, which we are just now considering. It is not strange, then, that farmers who have had no experience with

pure stock should entertain doubts as to such excess of profit, or hesitate as to making an outlay which seems to them of questionable expediency. Such hesitancy and doubt will disappear in due time; and when the supply of pure-blooded stock shall equal the demand, and prices rule at reasonable rates, the nondescript animals now ycleped "native cows" will become as rare on our farms as the spindle and distaff are in our dwellings.

It is presumed that all the heifers on exhibition are intended for milch cows. To make them good cows, something more is needful than unquestionable pedigrees. Whether a heifer should drop her first calf at two years old, or at three, has not been, and cannot be, determined by experiment, because the trial can never be made with the same animal. Theory, and observation also, so far as it can be relied upon, suggest that a heifer intended for breeding purposes, especially one from which bulls or oxen are to be raised, should not come in until three years old, as she will then be mature and vigorous,—conditions which will be likely to influence her progeny. A heifer intended for a dairy cow, if of average growth, may well come in a year earlier. In a heifer not having had a calf, the muscles of the neck and fore shoulders are very apt to thicken unduly, during her third year, and the udder to become distended with flesh instead of milk veins. If, by having a calf at two years old, she loses somewhat in the possibilities of growth, it will be because her subsequent developments are of milk-producing, instead of muscle-producing properties.

For a week before and a week or two after calving, the food of a heifer should be less nutritious than usual, rather than more so, and of a kind not promotive of the secretion of milk. The tendency to fever, and the pain and danger arising from prematurely distended milk veins, may be avoided by the exercise of discretion as to the quality and quantity of the food given.

While a heifer should always be kindly treated, she should never be petted, else, like a spoiled child, she will become disagreeable, possibly dangerous. She must be taught that her keeper is master, but she should never be taught in anger. Before calving, she should be rubbed about the legs and udder; and if this is done gently and kindly, she will quickly come to like it. The greatest liability to acquire vicious habits arises

from injudicious treatment on the removal of her calf. Not recognizing the claims of the butcher as superior to her own, this removal outrages her instincts, and the subsequent attempt to rob her of the aliment which, to her seeming, belongs wholly to her offspring, is but adding insult to injury. That she "with anger, should resent the proffered wrong," by the use of such weapons as nature gave her, is not strange. But, that her keeper, claiming to be a reasonable being, should deem such manifestations on her part deserving of punishment, or make them a warrant for similar exhibitions of ill temper on his part, or rest his claim to manliness upon his ability to out-kick his frightened dependant, *is* strange, "passing strange;" yet many a heifer, otherwise gentle, has been frenzied by just such brutality, until she has become an inveterate kicker, and been rendered thereby almost worthless. The act of milking, carefully performed, is a relief to any animal when the milk veins are distended; and if her keeper can but possess himself in patience till she recognizes the act as a friendly one, she will soon learn to submit to the process quietly and even to seek it gladly.

ALDEN S. BRADFORD, *Chairman.*

WORKING OXEN.

WORCESTER NORTH.

From the Report of the Committee.

It is with a good deal of pleasure that your committee find themselves able to put on record the fact of an increasing interest in working oxen. We have often wished that our farmers might possess that hearty and entire devotion to the interest of cattle training, which seems to characterize the lovers of horse flesh. All employments are yet to be tried, and awarded according as they are of *use;* and when that time comes, the training of working oxen will be elevated to that position which of right it occupies in scientific agriculture.

It has seemed to be our mission to at least aid, during the past twelve years, in placing ox training on this elevated basis,

and we rejoice to know that the farming community responds, by an appreciative verdict, to what has been done. The shrewd and progressive farmer of the present day, cannot afford to keep, and improve upon, any but the most perfect breeds of cattle; and in the same view he is inclined to regard those he employs for draught. He knows that the slip-shod manner of conducting the business of matching and training oxen for the farm, is the worst economy, even only so far as his own requirements for ox-labor are concerned; and when he comes to the market demands, every principle of true economy is against it. But it is matter for serious wonder why the majority of men acquainted with farming pursuits fail to recognize, practically, the fact that the standards in this department of their calling are greatly elevated, and that to compete with those who are up to the times, and make the raising and sale of cattle remunerative, they must abandon their old notions, and regulate their conditions to meet the facts of the new. In our view, the growing disuse of ox-labor, in favor of horse-labor, on farms, is an error; but if we were to employ the most effective means of converting all to this view, it would be ox-training carried to the highest pitch of perfection. Many of the arguments brought against the use of ordinary oxen on the farm, have no force against the *trained* ox. The farm is the appropriate sphere of labor for the ox, and in his training this fact should be kept constantly in mind. In our essays we have never failed to set forth, that it is the lighter uses for which our oxen should receive training. We regret that those who compete for premiums are not more familiar with this view; for although we honestly think that the conditions required to constitute oxen eligible to premiums by no means cover all that is desirable, or all that oxen are capable of doing, yet the most progressive interpretation of the terms cover more than competitors are wont to apprehend. In the matter of *backing*, for example, drivers show a too general ignorance as to what is desirable. It is not enough that a pair of oxen are capable of forcing a load back a certain distance—they must be able to do it within certain limits of space and *time*. To test cattle on these points, the weight of the load should be even more nicely adapted to the weight and strength of the cattle than if the trial were for draught. We cannot escape the impression that the rule of one-third more than the weight

of the team is too high, unless the team is trained up to a high point of efficiency.

And this brings us again to say, that far too large a majority of the oxen whose exploits on the cart it is supposed to be your committee's business to "sit in judgment" upon, are unworthy to compete, for the above reasons. It is quite evident that this class of teams have had no training *with a single view to the trial for premium.* This is not as it should be. We do not plead guilty to a desire to exclude any team, and yet it would not seem consistent with the society's intent that your committee should fail to suggest "a better way."

But the prime barrier in the way of all betterment in this matter, is, that trainers are incompetent. We wish it were possible to set forth, with force and clearness sufficient to instruct the more obtuse, the actual demand our present standard makes for efficient teamsters. This demand cannot be met by the class of self-elected teamsters (in whose mind no standard exists), who continually thrust upon the attention of judges achievements that are not creditable, even in the eyes of the ignorant crowd. But despite the difficulties which hedge this whole subject of teamstership and training of oxen, it is slowly, but surely, developing itself as a distinct, well-defined and most noble science. That several of our farmers' clubs have introduced for discussion the subject of training, must be regarded as an encouraging "sign of the times." Let us all, as much as we may be able, agitate for some definite standard; and we can but suggest to those whose jurisdiction may include necessary modifications of our by-laws, that the qualifications for premium be extended so as to require more grace, nimbleness, and a greater discipline in the minor movements, which truly are *desiderata* in oxen to be used on the farm. We should prove recreant to our sense of what is desirable, did we fail to indicate the direction the discipline should take.

It is well known that awkward cattle are utterly unable to take care of their *legs*, and of consequence the legs and feet of untrained oxen are constantly subject to mutilation, either from other legs and feet, or from the *chain*, as in logging, &c.; hence that part of their discipline which arms them against these dire calamities, is especially to be recommended. Indeed, we have known valuable pairs of oxen to be rendered *hors du combat* by

their struggles in "*hauling*," not the load to which they were attached, but each other! It is painful to witness the wild and senseless ravings of catttle that have never been taught the use of their muscles, and how to apply their strength to the master's advantage.

Competitors should understand that these points which we here touch upon are regarded as essential, and must enter into the estimate in awarding premiums. We must not only take the cognizance of the thing done as an ultimate, but we must regard the "how" by which it is done. It is this *how* that makes the comfort or discomfort of all who have to do with working oxen, and generally largely affects the merit of the performance. It is impossible to sever the connection between grace and highest use: the best way to do a thing ever involves taste, economy, and pleasure to the doer; thus on the score of utility, we urge these accomplishments. But it is noticeable that farmers are wont to view this matter in a different light, and to speak of the special feats we are advocating, as merely fanciful adjuncts, and not at all a necessary part of ox-training. A little reflection will suffice to correct this conceit, and it is because the prejudice which exists has no foundation in science or common sense, that we are obliged to write so much at length in this report. In a former article we have endeavored to lay sufficient stress on several points which we deem essential; and that competitors may the better prepare to meet the requirements, and thus some real advancement in managing oxen be made, we again allude to them. It is manifestly absurd to hope for any commendable degree of proficiency in "backing," unless oxen are taught the true position to be maintained. If cattle cannot keep their noses out of the ground; if they cannot hug the spear; if they cannot exert equal strength simultaneously, in shoving a load back,—though never so much muscle be applied, their effort will be a failure. Such cattle have no command of their force adequate to the situation, and we could as correctly rank them in the scale of merit *before* as *after* trial. Hence the time consumed in their case is thrown away. The power to accomplish great things lies largely in economy of forces. Our drivers ought to study the simplest laws of applied mechanics; they should familiarize themselves with the science of relatives, and to this end we want more lectures, discussions,

and consequent elevation of desire and knowledge. Let us seek to compel reference to higher standards; let us seek to establish and dignify those standards we already have, by installing them in legal positions before the classes whom it most concerns to reach those standards.

The Agricultural College should bear this practical fruit, and we must plant a professorship there, at no distant day, looking to the good of this noble interest.

ALPHEUS B. DAVIS, *Chairman.*

SHEEP.

HOUSATONIC.

From the Report of the Committee.

EWES.—The committee were gratified at seeing so many entries of Middle Wool Sheep. They are the best for mutton, especially the full-blood South Downs. It is a flock of this, and of breeds nearly resembling it, which for a great length of time has been held in the highest esteem in Great Britain, and on the Continent of Europe. And if the sheep growers of this country wish to increase the consumption of mutton,—causing it to take the place, to a certain extent, of the less healthful flesh of the hog,—they must supply the markets with the best kind. It cannot reasonably be expected that the community can be converted to mutton-eating by offering them meat of bad quality. Men would soon learn to love pure South Down mutton, juicy, tender and well flavored, who could never be persuaded to eat much of the flesh of sheep, having a strong taste, as is apt to be the case with Merinos, or having such an excess of fat as belongs to the large, coarse breeds.

By crossing our common sheep, or even Merinos, with South Down rams, we can obtain flocks producing excellent mutton, and at the same time yielding a good quality of wool. To do this successfully, it is absolutely essential that the ram be entirely full-blood, or a thoroughbred. The use of any kind of grade males, will be sure to vitiate the result, and disappoint the expectations of even the most careful breeders. And we

strongly recommend such sheep as being adapted to the wants of this district or country. The Middle Wools are not too large for the fertility of our pastures. If they require little richer feeding grounds than the Merinos, they do not need to be kept in our very best fields and meadows, like the Coarse Wools. If judiciously managed, they will improve our lands, greatly and speedily. Wherever a sheep lies down,—if it has a reasonable amount of room,—the grass springs up. They furnish the cheapest means for clearing up the old pastures which under a system of exclusive cattle-husbandry are becoming over-grown with briars, daisies, weeds and mosses. They make short work of such rubbish, and bring in its place white clover and the finer English grasses. Sheep husbandry is the true method of renovation for most of our hill-farms, now run down from the continual pasturing of cattle. If the Berkshire hills were situated in any of the old agricultural countries of Europe, they would be crowded with flocks. When an English farmer rents a farm, it is generally made a condition of the lease that he keep a certain number of sheep for the benefit of the land. In Holland, where farms are better cultivated than our gardens, there is a flock to almost every herd. Some of our own most intelligent and thrifty farmers have stated that, during the last few years of low prices for sheep and wool, they have found profit in keeping sheep. We think that the great majority of farms on the Berkshire hillsides ought to have, at least, a small flock of sheep on them.

J. M. Mackie, *Chairman.*

SWINE.

WORCESTER NORTH.

From the Report of the Committee.

On arriving at the pens and wagons containing the subjects of our investigations, it needed but a glance to convince one that in no kind of domestic animal had a greater change taken place within the last thirty or forty years than in swine. Who thought of inquiring, at that time, of what breed a hog was? A pig was a

pig; if he could eat and squeal, that was enough, he was all right. If he had any special points of recommendation it was the extra length of the nose and legs, and large size of the ears. Our first recollection of a breed of hogs, was the Byfield, after which came quite a number of imported breeds. Among those which were received with the most favor, was the Mackey, which was, undoubtedly, one of the best ever introduced in this vicinity. The Berkshires, while they furnished most excellent hams and parts for bacon and sausages, were deficient in the more important parts called middlings, being thin and not of uniform thickness. There is at present what is called the Improved Berkshire, which meets with more favor. The Suffolk, with their fine, delicate limbs and carcase, were found to be too small and inclined to fatten too early to be profitable, and they have in a great measure given place to the Essex, which now appears to be the favorite for a small breed, though many object to them on account of their color being black. Several years ago a breed, originated in Chester County, Pennsylvania, known as Chester County, or Chester Whites, which for size, early maturity, symmetry of form, aptitude to fatten at any age, has taken the rank in breeds of swine that the Shorthorn or Durham has among horned cattle. Some, in breeding, have paid regard only to large size, have produced only a large-boned, thick-skinned, coarse-fleshed animal, more inclined to grow than to fatten, which has not given satisfaction; while others, by careful and judicious breeding, have produced a superior class of swine, which, all things considered, is probably the best. Of this last class we found all the swine exhibited, either thoroughbred or grade Chester Whites.

The three fat hogs exhibited by Mr. Boyden, were fine animals, eleven months and twenty-six days old. The average weight was between six and seven hundred; the three weighing over nineteen hundred.

They were not coarse, but of fine symmetrical form, well proportioned and fat. The same may be said of the fat pigs of Mr. Nichols.

We often hear the remark, in regard to thoroughbred animals, that "blood tells." While this is true of swine, we think the contents of the swill pail also tells effectually, and it is by

the judicious blending of the two together, the best results are obtained.

It is a problem whether fatting pork at the present prices pays. As a general rule, it is best to get an early spring pig, and fatten, and kill it at from eight to ten months old. With proper care and feeding, a pig at that age will make from 250 to 300 pounds of pork, while if it was wintered over and kept until eighteen months old, probably it would not make more than 350 or 400 pounds. The extra 100 pounds would not pay for keeping ten months. For the dairy farmer who keeps hogs to eat his milk, it is better to get fall pigs and get them started while he has milk, and before very cold weather; they can then be cheaply kept through the winter on small potatoes, roots or apples, and be ready in the spring to take his milk, while spring pigs would not be able to take all of it from May until July, during the greatest flow.

At present prices, corn is, undoubtedly, the cheapest feed for hogs. In looking over the reports of experiments of the amount of pork a bushel of corn would make, in the Report of the Department of Agriculture, and other sources at my command, they vary in their results from seven to sixteen pounds per bushel, some stating that seven pounds of meal make one pound of pork. Allowing that a bushel of meal makes ten pounds of pork, which we think is more than it will average; we will allow for a pig ten months old, what milk, slops and other things of not much value, used to make 100 pounds of pork. This, if the pig weighs 300 pounds, leaves 200 pounds to be provided for, which would take 20 bushels of corn. This at 80 cents, the average price during the season, would be $16; the cost of the pig, $5, in, would make $21; 300 pounds of pork at 7 cents would be $21. Allowing the manure to pay for tending, would make about an even thing of it.

NATHAN CASWELL, *Chairman.*

HINGHAM.

From the Report of the Committee.

Nearly, if not quite all of the different breeds kept in this vicinity were present, either as full-blood animals or crosses between the most desirable kinds. The show was pronounced

by members of the committee who had served in the same capacity in previous years, and by all, as far as we know, as superior in numbers, size and quality to any made for several years.

"The largest fat hog," contributed by Hon. Albert Fearing, weighing seven hundred and twenty pounds, and for which he received the first prize, was a noble animal in all respects,—the heaviest we think ever on exhibition at any of our fairs, and attracted much attention; as also did his "best show of fat hogs," ten in number, a cross between the White Chester and Suffolk, which were awarded the first prize in their class. Mr. Fearing had other fine animals, particularly a litter of ten pigs, a cross of the Chester with the Yorkshire, eight weeks old, and very handsome.

Mr. David Whiton, the most extensive contributor to this department, showed a large number of very fine animals, for which he was awarded several first prizes. Mr. Whiton keeps and breeds a large number of swine on his farm, and has been very successful in growing the White Chester crossed with the Columbia County.

As usual, Mr. Alfred Loring exhibited his herd of ten swine, containing three distinct breeds, five Columbia County, three Neapolitan and two Yorkshire, all good, for which he received the second prize for "the best show of fat hogs." Subjecting all of his herd to the same conditions, Mr. Loring will be able to determine the comparative merits of the different sorts.

Mr. Charles W. Cushing exhibited a Yorkshire boar, a fine specimen of his kind, which took the first prize; and a breeding sow, a cross of the Yorkshire, Suffolk and Columbia County breeds, with a litter of six pigs, sired by his Yorkshire boar, which also took the first prize in their class.

Mr. Joseph Thomas had on exhibition an imported boar and breeding sow, both a cross between the Suffolk and Neapolitan breeds, which, considering their age, and that, as we understand, they have not been subjected to high feeding, showed many fine points.

After having decided to keep swine, the question arises as to what breed shall be kept; and, if the selection is made from among the full-blood breeds or crosses of them, where their characteristics and qualities have been well determined from a

long pedigree, there is but little risk that they will not almost invariably develop true to their name, and with sure and satisfactory results. Too many persons are willing to take a pig from droves of chance selection, and of, it may be, unknown breeds, diseased possibly when sent to market, or from herding together in large numbers, or from exposure, or fatigue from driving, or irregular feeding, and so meet with disappointment, if not entire loss. We think it is manifestly for the interest of those who wish to raise their own pork to purchase pigs bred in their vicinity, and so encourage farmers who have truly desirable kinds to produce numbers sufficient to supply the home demand, and at reasonable prices.

Whether pigs shall be kept through the winter and so to more age, that they may attain to greater size and fatness, is a question of choice and circumstance,—the extra care and trouble in the cold weather may be compensated by the larger quantity of fertilizing material which can be made, though the cost per pound, estimated on the cost of the food, will not generally vary essentially, whether the hog is nine or sixteen months at the time of slaughtering in the autumn. Unquestionably a bushel of meal will produce more pounds of pork in warm than in cold weather; and so, for those who may require not more than three hundred pounds for their family use, what is termed a spring pig may be the most profitable.

The subject of feeding is of great importance, that the best results may be obtained from the material expended. Pigs have been kept through the winter, in Hingham, entirely upon raw mangold-wurzels with very good results. Some feed coarse matter, as bran or shorts, with potatoes and much swill, while others use Indian corn and meal, believing that the best meat can be made from the best of food. Some cook the victuals either by steaming or boiling, and where a large number are kept, this may be profitable; but for one or two, very nearly the same result may be obtained by thoroughly wetting the meal with boiling water, and feeding when nearly cold. In cold weather, and perhaps all the year round, it would be advantageous to feed food of about the temperature of the animal's body, that no loss may occur to the animal economy in the process of digestion. Some feed but twice in twenty-four hours, dividing the time as nearly as convenient, giving as much at each time as will satisfy the

appetite,—thus giving time for the thorough reduction of the food to chyme before the introduction of more into the stomach, and avoiding all irritating and injurious consequences from too frequent eating; while the majority follow the practice of feeding three meals daily. Objection might be made to cooking food, or to any change in its form, or to any regularity in feeding, as in a state of nature none of these conditions enter as elements in the result; but we should remember that domestication for ages has not only changed their appearance, so that our fine porkers would be hardly recognized as of the same species as the wild hogs found in the jungles of India, or the repulsive-looking wart-hog of Africa, with its immense protruding tusks, wide nostrils, long legs and tail, and the whole appearance so formidable as to suggest anything but a hog, but subjecting them to such entirely different conditions has so altered their habits and constitution that very different treatment is necessary. Whatever method is adopted, and of course modes will differ with different individuals, enough should be given that the animal may develop progressively, and become in the end all it is capable of becoming according to the laws of its being.

It is somewhat doubtful whether pork can be raised in this vicinity with much profit in dollars and cents, owing to our great distance from the great grain-growing sections of the country,—transportation so enhancing the cost of so bulky a commodity, that it can be fed where grown, and the product delivered here in about one-fifth the weight; as very nearly a ton of grain will generally be required to make a hog weighing four hundred pounds. And yet there may be pleasure in watching the growth of a fine animal, satisfaction from knowing what materials and conditions have contributed in the production of our food, and for those who keep a vegetable garden, the product of much good fertilizing matter, which may make it after all not altogether an unprofitable adventure.

And now having our hog, shall we eat him? Some say, no: more, yes. Think of the immense numbers that are slaughtered yearly in the United States, and consequently how largely in one form or another they enter into our daily food, affording in the opinion of many, flesh as delicate and finely flavored as can be found anywhere among the animal creation. Doubtless for persons of scrofulous habit, it may not be well to use much

porcine meat; but with this, as with other articles of food, all must judge for themselves.

In the last report of the Commissioner of Agriculture, the the number of hogs in the United States is given as 26,751,400, at an average price of $6.99, giving a value of $187,191,502; while the export of hogs, with their immediate manufactures, for the year ending June 30, 1870, was $15,624,190. Some idea of the extent of this business may be had, when it is remembered that this was at a time when there was great loss and discouragement among farmers on account of cholera, which proved fatal to thousands.

We recommend, then, the keeping of swine by all who have accommodations, and want this article of food in their families, selecting a pig of approved breed, feeding well, and, in a term of years, the balance will most certainly be found on the right side of the account. Let the society then continue to encourage liberally this branch of husbandry.

De Witt C. Bates, *Chairman.*

POULTRY.

MIDDLESEX SOUTH.

Statement of Sturtevant Bros.

Our flock consisted of about thirty head in March, when the account commences, and varied, by purchase and the hatching of chickens, from this number to about two hundred and twenty.

About April 12, a flock of nine dark Brahmas was purchased and set apart.

About April 12, a flock of seven Partridge Cochins was purchased and set apart.

About March 24, a flock of six, afterwards increased to nine, light Brahmas, was purchased and set apart.

At date, the dark Brahmas had laid 172 eggs, or 21½ per hen.

At date, the Partridge Cochins had laid 158 eggs, or 26⅓ per hen.

At date, the light Brahmas had laid 673 eggs, or about 97 per hen.

No separate account was kept of the amount consumed by those set apart, but an account of the quantity fed out to the whole flock is here given.

March, 4 bushels of corn; April, 2 bushels of corn, 2 bushels of corn meal; May, 6 bushels of corn, 4 bushels of corn meal, 2 bushels of oats; June, 3 bushels of corn, 4 bushels of corn meal, 1 bushel of oats; July, 8 bushels of corn, 8 bushels of corn meal, 4 bushels of oats; August, 8 bushels of corn, 6 bushels of corn meal, 5 bushels of oats.

By this account it appears that 30 adult hens, increased to fifty-five in April, can be kept, together with their progeny, 165 in number, from March 1st to September 1st, for fifty-five bushels of corn and 12 bushels of oats.

Substituting values for the above form, and calling each hen worth $1, as is customary, and chickens half price, we have the following:

Dr.	Fifty-five hens, at $1, . .	$55 00	
	Cost of feed, ...	51 00	
	Total, ...		$106 00
Cr.	Fifty hens, at $1, . . .	$50 00	
	165 chickens, at 50 c., . .	82 50	
	Total, ...		$132 50

and the eggs and manure extra. But as this poultry is superior of its kind, it would bring on sale a larger price than is here given, which materially adds to the profit.

STURTEVANT BROS.

BRISTOL.

From the Report of the Committee.

The Committee on Poultry congratulate the society on the most magnificent display ever exhibited upon these grounds. There were no less than one hundred and twenty coops in all, and many of these embraced the best specimens of noted breeds.

We think we are justified in saying that no more beautiful and attractive collection has ever been witnessed outside of a

regular poultry show. It is highly gratifying to your committee to perceive the growing interest taken in this department, and note from year to year the increasing discrimination shown by breeders of the different varieties. The wisdom of the policy adopted by the society a few years since, of largely increasing the premiums upon poultry, has been nobly vindicated by the success that has resulted.

The space allotted to this department, though apparently ample, proves too narrow to accommodate the throngs that passed in an almost uninterrupted stream from morning till evening in front of the coops; and your committee would respectfully urge upon the committee who have this matter in charge, to give them at least *double* the space between the cattle-pens and the poultry-shed next year. The crush here was at times almost dangerous on account of the liability of accidents from passing carriages.

The show of poultry is always a chief centre of attraction, and especially to women and children, and we doubt whether any other portion of our annual fairs presents such objects of interest to so large a number.

This is scarcely to be wondered at when we take into consideration the great variety and beauty that characterize the different breeds of poultry. In very few departments has the science of breeding reached such exact and striking results, many of them being the product of only the last fifty years. The breeding of poultry has therefore attractions for the man of scientific tastes as well as for the mere lover of beauty. It would seem as if all classes of admirers must have found something not only gratifying, to their æsthetic taste, but instructive, in the careful examination of our unequalled display. As a kaleidoscope of color alone, it is well worth seeing. There were the splendid Partridge Cochins of Philander Williams, with their rich, warm pencillings and full breasts, almost rivalling in size that king of American birds, the turkey; light and dark Brahmas, with picturesque markings of black and silvery grey; buff and cinnamon Cochins, with their soft, subdued tintings and the "pale faces" of their race; the showy black Spanish, contrasting as notably with their Indian cousins as the Spanish cavalier of the olden time with our Indian predecessors. There were the far-famed English breeds, the white and gray Dorkings,

with their unrivalled plump breasts of snow and delicate salmon color; and those beautiful representatives of France, the black Crevecœurs and speckled Houdans, who wore their crests as proudly as if they were true patents of nobility; snow-white Sultans stood side by side with black and golden Polands; and exquisitely penciled gold and silver Hamburgs and Games, whose beauty of plumage and gracefulness of form and carriage seemed to fill up the full measure of perfection, paraded their charms by the side of Leghorns, whose plumage, white as drifted snow, seemed to turn the crimson of their combs to scarlet. Last, and not least, those exquisite miniatures of their race, the black, red and silver Game Bantams, seemed to fill out with Sir John Sebright's pets the full bouquet of feathered splendor.

Still farther on, coops of black, bronze and white Turkeys were conspicuous beside smaller cages of Guinea fowl and Pigeons, and fine specimens of wild Canada, Bremen, Brant and India Geese, Rouen and Aylesbury Ducks presented a pleasing contrast. To cap the climax, a large blue Heron, placed by some one on the upper tier of cages, stood sentinel over all, and appeared the least interested and most unmoved of all the spectators.

We do not forget, however, while paying tribute to the general attractions of this department, that its beauty is its least important feature. We hear constantly the inquiry made, "Does it pay the farmer to keep pure breeds?" We think such an exhibition as this goes farther to answer such questions satisfactorily than any number of arguments without the ocular demonstration.

For one of the trios of the Cochin variety on exhibition the owner had refused an offer of one hundred dollars, and yet, this same trio, if killed and sold at market prices, would hardly have brought more than six or eight dollars. We are aware that this is an exceptionably high price, but it can hardly be doubted that the average value of our best thoroughbred varieties is two or three hundred per cent. higher than ordinary mixed breeds.

This results from the knowledge which is being every day more widely extended and more deeply impressed, that *only pure breeds transmit with certainty their desirable characteristics*. This is the whole gist of the matter in a nutshell. It is beginning to be generally admitted that the same principles

which apply to the breeding of other stock are applicable to poultry.

We can hardly better elucidate our meaning than by the insertion here of portions of a letter and statement received a few days since by the chairman of your committee, which hits the matter under discussion very aptly:

NEW BEDFORD, October 16, 1871.

Mr. E RODMAN:—In compliance with your request, I send enclosed an extract from my poultry account for 1870. I select this year because, while it shows but little actual pecuniary profit, it *does* show how easily our farmers might change their miserable mongrel flocks, laying six eggs and then clucking two weeks, for really good profitable fowls.

The fowls kept were mostly White Leghorns, in my estimation the hardiest and most prolific of the non-setting breeds. Taking into consideration the fact that these fowls have been closely confined most of the time to about six rods of land, I think the number of eggs laid very large, while the cost of feed is rather small. Thirty cents per dozen, the estimated price of eggs, is very near the average wholesale price for the year.

Some objection may be made to my estimated increase in value of stock, but I think no competent judge would consider it too much. I think I can safely say that the chickens raised by me this year (1871) from this stock are as fine as any in the country. * * * * * * * * *

One of my pullets, hatched May 4th, 1870, began laying November 2d, and continuing up to the present date bids fair to finish the twelve months. Others, hatched June 14th, began laying December 11th, and still continue. This year (1871) two pullets, hatched March 8th, began laying July 10th and 28th (mark the improvement), and I see no reason why, if properly cared for, they should not lay until next August.

These few facts suggest many others, the results of my experience with this breed, but I will not trouble you with them now.

Hoping the report will give you a little of the statistical information that you want, I remain, yours truly,

JOHN ELDRIDGE, JR.

Extract from my poultry account for 1870:

Average number of fowls kept, 14 (2 cocks, 12 hens). Number of eggs laid, 1,783. Average per hen, $148\frac{7}{12}$.

During the year the fowls in my yard averaged—cocks, 2; hens, 12; chickens, 20.

Purchased $29.09 worth of feed, and used all the available scraps from the table. Average cost of feed per fowl, nearly $85\frac{1}{2}$ cents.

Stock January 1st, 1870, 14—11 Leghorns, 3 common.
" " 1871, 17—15 " 2 "

Showing an increase of only three fowls, but with almost an entire change from ordinary Leghorns to one of the finest and best strains of this variety in the country.

From 107 eggs set, I got 51 chickens. Of these I had but ten, January 1st, 1871. This was the most unsatisfactory part of my year's work. My balance shows:

Cash paid for fowls,		$13 50
" " feed,		29 09
" " fixtures,		8 51
Interest on land and buildings at 7 per cent.,		12 60
		$63 70
Received for fowls,	$14 58	
" " eggs,	3 17	
1,638 eggs used, at 30 cents per dozen,	40 95	
Estimated increase in value of stock,	45 00	
		103 70
Difference,		$40 00

JOHN ELDRIDGE, Jr.

It is but due to Mr. Eldridge to state that a trio of his Leghorns took the first premium over a large number of competitors at the late Bristol Central Agricultural show; and that his stock is not surpassed, if equalled, by any in this section, is the opinion of the best judges who have seen his fowls. It will be seen by a careful study of the above statements, that if Mr. E.

had been only ordinarily successful in raising his chickens, there must have been a much handsomer profit. As it is, there would have been absolutely none at all but for the improvement of the breed.

The wonder, considering the limited space at command, is, that they did half as well, and with an ordinary mongrel breed that there would have been positive loss there can be no doubt. We shall be greatly surprised if the results of the present year, with his improved stock, do not greatly exceed those of last year.

It seems to be the general opinion among farmers that the chief profit to be made from poultry is in their egg-producing qualities, and this, except in exceptional cases, is no doubt true. But in order to place all upon an equality, every one who is anxious to improve breeds of poultry should exert his influence to get a law passed by the legislature, *compelling the sale of eggs by weight.* Nothing can be fairer than this method, and scarcely anything is more directly the reverse than the prevailing custom of selling them by the dozen. Take, for instance, as one of the most prolific breeds, the Houdan, a hardy, vigorous bird, which rarely if ever sets. They lay eggs so large that many would say they must be double-yolked. Eight or nine of these eggs will weigh quite as much as an ordinary dozen from fowls whose weight is considerably greater. This is the case to a less degree with Leghorns, Hamburgs and other egg-producing breeds. Yet here is a certain superiority for which the breeder gets no return, and it is consequently for the interest of farmers to keep fowls which lay comparatively small eggs, but have larger bodies, so that when killed they can realize a larger profit. This subject is so important for the interest of all concerned, consumers as well as producers, that we hope to see a united effort made by all the agricultural societies of the State, as well as poultry associations, to get such a law as indicated above, passed by our legislature.

The only class who might oppose it are perhaps the middlemen, and the fewer of these for the true interests of the farmer the better. When the day arrives in which the farmer can realize retail as well as wholesale profits, agriculture will be a far more profitable profession than it now is.

Improvement of Coops.—One of the most note-worthy points

in our exhibition was the great improvement in coops. The purchase by the society last year of their standard cages appears to have stimulated the ambition of exhibitors, and a poor coop was the exception, and not the rule, as in former years. Not only does a due regard for the proper display of fine birds demand this, but not in a less degree the comfort and health of the occupants. We noticed some cages, otherwise unexceptionable, that had no ventilation on the back side near the top. This is quite an important matter, as fowls suffer more from want of pure air than from all other causes combined. This combined with dampness is the chief cause of roup and its kindred diseases whenever a large number of fowls are crowded together in ill-constructed quarters.

General Management of Poultry.—So much has been said in previous reports upon this subject that little more remains to be said. The importance of a good run with plenty of grass, not less than an acre to twenty-five hens, can hardly be too strongly insisted upon. We are aware that fowls can be kept profitably in much closer quarters, but not without much more care and attention than farmers are willing to bestow. It is the custom with many to shut up their poultry in a confined yard or slatted coop of the most inadequate dimensions, for two or three months of the year, when of all others they would prove most profitable if suffered to run, because of the kitchen-garden. One-half of the ingenuity, time and expense exhausted in the construction of these insufficient yards, would place the garden, in most cases, out of their reach, and the losses from roup and other diseases would cease, while the supply of eggs would be considerably increased.

The male bird should be changed every two years, to prevent breeding in and in.

Among the laying breeds we cannot too strongly recommend the Houdans as a hardy, prolific fowl, the hens attaining an average weight of six pounds, and the cocks eight to ten pounds. The high price at which these birds have been held by fanciers has prevented their general introduction, but an experience of three years in breeding them has convinced us that it is the most valuable of all the late importations for the farmer. In

cases where a pair or trio are not obtainable, the Houdan makes a valuable cross with any of the large breeds.

The Plymouth Rock is a fine bird, which seems to be growing in favor. Whether the breed is a well-established one remains to be proved. The Partridge Cochins, light and dark Brahmas, need no commendation from us. They speak for themselves. The verdict of the American people seems to be strongly in favor of these noble breeds, and for those who wish to make a specialty of *raising pure bloods* for sale, these promise the most remunerative returns.

In closing this part of our report, we desire to tender our thanks to the many patrons of our department for their noble contributions. It would be gratifying, if time and space permitted us, to mention in detail many of these which were especially creditable. The large number of contributions prevents us from attempting it, and to do it partially would be an invidious task.

EDMUND RODMAN, *Chairman.*

PLYMOUTH.

From the Report of the Committee.

We think that the accommodations for poultry might be improved so as to benefit the fowls, the committees, the exhibitors, the visitors and the society. There is not room enough under the shed for all the coops; the roof is not wide enough to screen the fowls from the sun, which is sometimes very annoying, or to keep out a driving rain; or tight enough to prevent water running through and soaking the birds unfortunately placed in coops with open tops, as I observed last year. There being a want of room, some coops are placed on the ground,—a great disadvantage, for when there is a crowd of visitors, they might about as well remain at home for all chance of being seen. The other extreme is about as bad: placing coops in the highest part of the shed prevents all but very tall people from seeing the birds to advantage. The arrangement of the coops is a matter of importance. Having the fowls of each class placed together greatly facilitates the labors of committees, and is much more convenient and pleasant for visitors than having them scattered about. Two persons to receive the fowls as they are brought in,

and arrange them properly, could soon put things ship-shape, and contribute to the pleasure of all.

It seems to me that the great secret of success in exhibitions of this kind, is to place every single thing fully and fairly before the public. Every man has his preferences; he cares most to see some particular part of the show, and he looks with favor on some other parts of the show. He speaks well of it, and next year comes again and brings others with him.

There is another matter connected with the exhibition to which I would refer, and would say that in this I do not express the opinions of the other members of the committee. Premiums are offered for trios of fowls. Some exhibitors place four, five or more in a coop, which I think objectionable for these reasons.

A coop for five or six must be larger than one for three, and of course takes up more room than the latter. Where room is scant, each should give his neighbor his proper share, and be content with the same amount. It takes much more time to decide on the merits of a trio of fowls, if one, two or three of the same breed are placed in the coop with them. In the first place the three best have to be selected, and a comparison of them with other trios is difficult in proportion to the number together. When the decision is made, and the premium card placed on the winning coop, how is the visitor to know which the committee meant in making the award?

When more than the required number is put in a coop, it is probably because the owner felt unable to select the best trio, or else believed them all superior, and wished to show them to please himself. Were premiums offered for the best *lots* it would be different; but as only *trios compete*, it seems best that all others should stand aside and let the competing birds be seen. The giving premiums to things in general is not to be commended. It enables the successful exhibitor to sell (if so dishonest) all the fowls in a coop as premium fowls. If one great object in the exhibition of poultry and the award of premiums to best specimens is, in short, to educate the public in this regard, does not the practice to which I allude tend directly to defeat that object?

The rule in making entries requires a statement of what is entered; the breed, age, where raised, mode of raising and feed-

ing. Statements were received from three-fourths of the exhibitors, all very brief, none of them full in all points; for instance, only one contained anything on the mode of raising, and this was deficient on all other points except breeding. One, a fair specimen of the whole, contained six words and four figures, and probably answered every purpose *except* the promotion of the poultry interest by the diffusion of useful information. Nine said nothing about their modes of feeding. Two fed on corn; two on corn and meal; one on corn, meal and oats. The mode of raising chickens of the gentleman to whose statement I referred, is as follows: he feeds them on cracked corn, soaked in skimmed milk, with milk to drink, and lets them run at large. Has raised over a hundred this year without one case of sickness. In summer, his old fowls are kept in a yard most of the time, with food by them constantly. In winter, their food is oats and corn with a few boiled potatoes, with plenty of water.

The results of this mode of feeding are good as far as health is concerned, and the fowls exhibited by the gentleman showed what could be done by it. I think a *change* of food would have been well occasionally, and that a substitution of oat-meal or ground oats and barley part of the time, especially at first, would have been better, also some whole barley as soon as the chicks were old enough to eat it. Corn contains more of fat-forming material, and the other grains, of that which goes to make bone and flesh. If size is wanted, it is important that suitable food should be furnished in the first few weeks. Milk is good for drink, and with eggs made into a custard is frequently given. Boiled eggs at first is a very common way of feeding. Cooked meat chopped fine occasionally—growing grass cut short early in the season and mixed with the food,—wheat bread or oat-meal steeped in Scotch ale in severe weather, and for weakly chickens,—sulphate of iron in the drinking water, for the same purpose—camphor gum in the water to prevent gapes,—these things and some others, I have tested and find beneficial.

The rearing and management of poultry is a fascinating pursuit. Who, having been engaged in it any length of time, does not look back with the liveliest emotions to the period when he first took an interest in it? It may have been a small beginning, the results of which as well as of later endeavors may have been discouraging; but the attraction still continued, and as he

gradually came to know more of his feathered friends by reading and observation, the more pleasant and profitable it became. At first, some mongrel bird with brilliant plumage was the acme of perfection; then, as he learned that shape was of importance, and that the best results in that respect as well as color could only be produced with certainty by pure-bred birds, he sought some established breed. No matter which he selected, he found a new source of pleasure. If beautiful plumage was his ambition, he had the pleasure of knowing he could produce it and the mongrel was dethroned. Or if he sought substance, symmetry or prolificacy, he soon learned where it might be found. The more he learned of poultry, the better selection could he make for his own yards; the greater care and skill used in breeding, the greater the reward.

If a person is about to commence keeping fowls as a new business, and wishes to understand it thoroughly, let him first of all get an insight into the principles of breeding. Let him lay the foundations of his poultry education broad and deep by studying as thoroughly as possible whatever bears on this point; now let him read *all* the poultry books procurable; I say all, for although some are not very good guides alone, each contains something it is well to know, and the diligent student will soon ascertain which is good authority. He will find, too, that he must use his own judgment, and not follow any one writer in all things implicitly. The next step is to become acquainted with the different breeds. Poultry shows afford the readiest means for this, and a visit to the yards of a fancier, with a quiet chat with the owner, affords a pleasure unknown to the uninitiated. It is best not to commence with too many breeds, as there is yet much to learn, and unless one can devote his whole time to it, things may go wrong; inexperience makes bad worse, and the result may be disgust with the whole business.

Something substantial in the way of returns, would, I apprehend, be the object of most who should engage in poultry keeping. That some find it profitable there is no doubt. That those who do not might with benefit look carefully at their own management and that of others, may be equally true.

JOSEPH P. CLARK, *Chairman.*

Statement of Lucius Dunbar, of West Bridgewater.

Without proper care no one can derive profit from raising poultry. I keep my houses and coops dry and clean, scalding the roosts frequently and whitewashing all parts of them; keep ashes, lime and sulphur sprinkled about; allow no manure to collect in the coops, and have no room in them for vermin. I feed my chickens on cracked corn, keeping it by them constantly till they are two months old, giving them also scraps from the table and fresh water two or three times a day. My older chickens and hens are fed on corn, cracked corn and meal mixed with sour milk or water. From March 1st to June 1st, I feed meat and potatoes three times a week, on alternate days, always keeping ground oyster shells and fresh water by them. The chickens have a run of three acres in different directions, each litter being kept as far as possible from all the others. The hens are shut in a yard till the latter part of the day, when they are allowed to run free. I submit the following account, which does not include the expense of or income from any fancy breeds of poultry :—

DR.

March 1, 1871.	To 47 chickens on hand, at $0.25,	$11 75
	23 hens " " " 1.25,	28 75
	2 cocks " " " 2.12,	4 25
To 50 chickens bought,		17 40
30 bushels cracked corn,		27 98
12 " meal,		11 54
22 " corn,		21 14
114 pounds meat, at 3½ cents,		4 00
Scraps,		2 00
1 bushel middlings,		1 05
29 dozen eggs for setting,		8 70
Oyster shells,		70
5 bushels potatoes,		1 25
Total expenditure,		$140 51

Sept. 26, 1871.	By 40 chickens on hand, at $0.15,	$6 00
	30 " " " .40,	12 00
	21 " " " .87,	18 27
	15 hens " " 1.00,	15 00
	2 cocks " " 1.75,	3 50

By 199 chickens sold,	$187 02
110½ dozen eggs sold,	33 96
4 bbls. manure sold,	10 00
7 " " on hand,	17 50
Total income,	$303 25
Total expenditure,	140 51
Net income,	$162 74

The supervisor says:—

Mr. Dunbar's account, although evidently not forced in his own favor, would hardly be accepted by experts as a correct exhibit of profit and loss. For instance: he has charged himself, March 1st, with 23 hens and 2 cocks, which number was reduced, May 1st, to 15 hens and 1 cock, without apparently any corresponding credit. On the other hand, he has charged nothing for use of buildings, nor for cost of coops and other appliances, which, judging from an occasional inspection of a poultry dealer's premises, cannot be inconsiderable. The estimate of the value of the manure, is not perhaps open to objection. In one view any article is worth what it will bring in market, and the sale of a portion at a specified price, may be accepted as an indication of the value of the residue. But if an average of less than 20 hens, with the addition, for a portion of the time, of two or three hundred chickens will, in six months, give a return of nearly $28 in manure, one element in the profit of poultry keeping has been generally lost sight of in estimates heretofore made. That such manure, when unadulterated, is a powerful fertilizer, inferior only to Peruvian guano, is probably true. One evidence of its efficacy may be found in the fineness of the sward and the luxuriance of the grasses always noticeable in the vicinity of dwellings where fowls have run at large for a series of years. But whether, when largely mixed with other substances, as it must have been in this instance, its fertilizing value is as great as represented, will probably be questioned till determined by actual experiments.

But, after making any adjustments which those interested in the subject may deem necessary, in view of the suggestions above made, or others, Mr. Dunbar's account will still show a very handsome balance of profit on the investment, and a very considerable degree of success in the management of poultry.

Jacob H. Robinson, presents a detailed account of the expenses and income incident to keeping 24 hens and three cocks, from March 1st to April 20th, and 12 hens and 2 cocks, from April 20th to September 30th, the fowls being what he calls a "mixed lot," among which he names Buff Cochins, Dark Brahmas, Sicilian fowl, Golden Hamburg, and crosses of the Black Spanish and Leghorns. From this account, which is balanced monthly, it appears that during the months of March, April, May, June and September, the value of the eggs produced exceeded the expenses of keeping his whole flock (the greatest excess being in March), and in July and August, while feeding many young fowls, the reverse. The balance of credit for the entire period, taking the eggs only into account, is $7.03, the aggregate of profit having been derived mainly from fowls raised. A summary of the account is annexed, from which the cost and proportionate quantities of different articles of food supplied may be ascertained. Mr. Robinson gives no further information as to his mode of treatment than what is contained in these figures:—

DR.

To 9¾ bushels corn,	$9 55
212 lbs. wheat screenings,	5 11
4½ bushels corn meal,	4 45
1¾ bushels oats,	1 95
1½ bushels potatoes,	60
Total,	$21 66

CR.

By 102¼ dozen eggs,	$28 69
Balance credit,	$7 03
Add 20 Buff Cochin pullets raised,	13 00
12 Brahma " "	10 25
6 Light Brahma cocks,	4 50
11 Sicilian fowl,	5 50
10 Black Eagle,	5 00
7 Brahma cocks,	3 50
3 Dark Brahmas,	1 50
Net income,	$50 28

DAIRY PRODUCTS.

HAMPSHIRE.

From the Report of the Committee.

Milk.—The milk of cows is considered, by general consent, the most congenial food for man. Investigations in regard to its proximate constituents and their chemical composition, have taught us, probably more than anything else, what are the requisites of a really good diet. The relative nutritive value of the long list of substances which make up our choice of articles of food, has frequenty been decided by a comparison of their chemical composition and their physical condition with that of milk. A liberal use of milk promises to benefit both the dealer and the consumer, and deserves hearty encouragement. It is of the utmost importance to obtain it in a pure, normal condition. The main components of milk are partly of an organic and partly of an inorganic character. They consist of butter, casein (or cheese stuff), sugar of milk, the phosphates of lime, magnesia and iron, the chlorides of potassium and sodium, besides some soda in combination with casein. All these compounds, with the exception of butter, are present in solution; the latter substance is merely suspended in the liquid in countless small globules, and causes the peculiar color and the opacity of the milk.

Each fat or butter globule is surrounded by a very thin coating of a nitrogenous substance, which disappears soon after exposure to air at a favorable temperature. A slight alkaline reaction of the fresh, normal milk causes the solubility of the casein; and the low specific gravity of the suspended fat globules favors their rising to the surface, where they form cream. The milk from a healthy cow always contains all the previously enumerated constituents, yet in a somewhat varying proportion. The quantity of milk which can be obtained from a cow, and also the quality which each individual cow of any particular breed furnishes, depends, as is well-known, on a number of circumstances, the most important of which are, the constitution, the condition and the age of the animal, the amount and the kind of food, and the time and manner of milking. I do not

propose to treat on these important points here in detail, but intend to confine myself to a short discussion of those qualities of milk which affect its commercial value, and to describe a few of the methods for testing it. The constituents of a normal milk have been found to vary, usually, within the following figures:

Water, ...	86.0	88.5
Butter, ...	3.0	4.9
Casein, ...	3.0	4.9
Sugar, ...	3.4	5.2
Saline compounds, . . .	0.6	0.8
	100	100

Its solid matter has been noticed to vary in extreme cases, even from 11.0 to 16.8 per cent., and its specific gravity from 1.026 to 1.034 at 60° F., taking water of that temperature equal to 1.0. As the presence of butter has a tendency to lower the specific gravity, and the presence of casein, sugar and saline matter reacts in the opposite direction, and as all these various constituents are liable to vary in percentage, it is plain that no reliable deduction can be drawn in regard to the total amount of solid matter in milk, from a mere test of its specific gravity. Skimmed milk of a high specific gravity—1.0338 to 1.0347—contains ordinarily but from 10 to 11.1 per cent. of solid matter; while a milk unusually rich in cream of a specific gravity equal to 1.026, has been shown to contain not less than 16.8 per cent. of solid matter. A common, good, unadulterated milk has a specific gravity from 1.029 to 1.033, and contains from 11 to 14 per cent. of solid matter. These facts in regard to the composition of milk render it certain that the common practice of deciding the question, "*what* is *genuine* milk, and *what* is *watered* milk?" is open to serious objection, unless supported by a supplementary test, since it is liable to awaken an unjust suspicion of fradulent practices on the dealer, while it does not efficiently protect the consumer against serious imposition. To protect the dealer against unjust accusations of dishonesty, the scale of specific gravity had to be lowered to a degree (1.026) which would leave it possible for him to add at least one-fourth of water to an ordinary good milk, without rendering himself open to the suspicion of fraud. There is little reason with us to fear

the adulteration of milk with chalk, flour, starch, sheep's brains and other auxiliaries and abominations, of which our books tell us, as long as water will answer all practical purposes; since it is abundant, and a periodical connection between the milk pail and the pump—if not overdone—has been quite a safe operation hitherto, as far as the chances of detection are concerned. This unpleasant circumstance was clearly demonstrated in a recent report of my friend, Professor C. F. Chandler, of New York city; in which he states, that actual experiments induce him to believe that the inhabitants of the cities of New York and Brooklyn get their annual supply of milk, which amounts to one hundred and twenty million quarts, diluted with forty million quarts of water; for which adulteration, at ten cents per quart, they pay four million dollars. I need not say that Prof. Chandler did not base his conclusion on the results obtained merely by the application of any of the various areometers for ascertaining the specific gravity of milk.

Farmers who convert the milk of their cows, upon their own grounds, into butter and cheese, have probably little need of good modes of testing milk, for the result of their dairy operations will tell them sometimes, at least, what their milk is worth. Outside consumers are quite differently situated; and a few remarks on some of the modes of testing milk for commercial purposes may interest them. The first instruments introduced for testing milk were several arbitrarily arranged areometers. Doerffel's milk balance, and Dinacourt's galactometer are frequently mentioned in this connection. Doerffel's instrument consists of an areometer with a scale of twenty degrees. Zero implies wa er at 60° F., whilst 20 degrees refers to a liquid of 1.0333 specific gravity, and is equal to 9.5 degrees of an ordinary saccharometer. The latter instrument may be used instead of Doerffel's, their relations being expressed by the following figures:

Doerffel.	Saccharometer.	Specific gravity.
11.0	5.1	–
12.0	5.6	–
13.0	6.1	–
14.0	6.6	1.026
16.0	7.6	1.0310
17.0	8.1	1.0332
20.0	9.5	1.0333

Dinacourt's galactometer is also an areometer, but divided into 100 degrees. 100 degrees is equal 1.029 specific gravity, which concentration is assumed to represent that of good milk; zero indicates pure water. For testing skimmed milk a similar instrument is used upon which 100 degrees refers to a specific gravity of 1.033, the specific gravity of skimmed milk under ordinary circumstances. From the fact that the specific gravity of good milk, after being *raised* by *skimming*, may be *restored* by the *addition of a certain amount of water*, it is obvious that the principle which underlies the application of hydrometers is here of little value. To supplement the preceding mode of examination, optical tests have been proposed. Donne's and Vogel's lactoscope are designed for that purpose, and are based upon the assumption that the more concentrated a milk is the thinner the stratum through which light will pass. A scale is connected with the instrument to determine the difference between good milk, and water, and mixtures of both. Unfortunately the fat globules mainly cause the purity of milk to vary in percentage, even in a pure article, so much that very little information can be deduced from these indications beyond the question concerning the amount of butter present. Examinations with the microscope are very instructive, yet they require the hands of experts. Quite satisfactory results may be obtained by ascertaining the specific gravity of milk, and the subsequent measuring of the amount of cream which separates from a given quantity of it at a certain temperature in a given time; in other words, test the milk in its fresh condition, and again after the cream has been separated by means of any good areometer, and notice the amount of cream that has been formed. Proskauer's areometer is constructed with regard to these points; a scale based on actual observation increases its usefulness. Whenever time and circumstances permit, it is advisable to ascertain the specific gravity of the milk, and determine its solid matter by weight, after careful evaporation to dryness. Our exact modes to scientific purposes are unobjectionable, yet they require more time than will usually be allowed for mere commercial inquiries.

Butter.—Whilst duly recognizing the particular claims of mere practical experience in the successful manufacture of but-

ter, I do not hesitate to express the belief, that a more careful attention to the chemistry involved in that operation will eventually give to the practical dairyman a better understanding of the many difficulties which not unfrequently surround him in his pursuit.

Milk begins to change directly after its removal from the cow, and while we are able to retard these changes to some degree, yet we cannot entirely prevent them under ordinary circumstances.

Mere contact with the air and its microscopic germs inaugurates a peculiar process of fermentation; the thin coating of nitrogenous substance, which covers each individual fat globule, soon enters into solution, and the globules rise to the surface; the sugar of milk by degrees turns into lactic acid, which gradually changes the original alkaline reaction of the milk into an acid one, and the milk grows thicker in consequence of the beginning coagulation of the casein (cheese stuff). The longer the period of time between milking and souring, the more copious is the separation of cream. Cleanliness and proper temperature (54°—56° F.) are the most efficient means to retard the souring process, and shallow vessels are used to shorten the passage of the globules to the surface. In case the milk changes too rapidly, many of the fat globules will be retained in the thickening milk, and the reduced cream moreover be strongly impregnated with coagulated casein. To keep the cream too long in contact with the souring milk has a similar effect: it introduces casein, which, if not thoroughly and seasonably removed, will surely impair the quality of the butter. To avoid this disadvantage the cream is collected, from time to time, before a decided coagulation is noticeable; some collecting it after six hours, others after twelve hours, which is the universal practice in Holland. To secure the best flavored butter, the cream must be removed while the milk is still sweet.

The cream contains all the constituents of the milk, yet in different proportions; its proportion of butter varies usually from 20 to 30 per cent. Butter made from fresh, sweet cream excels in taste, but does not keep well; it being difficult to remove from it all the milk-sugar and casein, and to give it the desirable compactness.

The practical rules for making butter must therefore vary

with the object in view, whether it be to obtain butter for immediate use or for keeping. To avoid some of the results which attend the working of fresh, sweet cream, the following course is frequently pursued:—The cream is placed in suitable vessels, and kept at a moderate temperature (54° to 58° F.) until it is rendered more compact, and at the same time acquires a slight acid reaction, in consequence of which the milk-sugar is effectually destroyed; the watery liquid which settles under the cream is carefully removed, and the cream churned at a temperature of 54° F. All these, and also the succeeding operations, tend simply to remove the fat globules as soon as practicable from the remaining constituents of the milk—the milk-sugar and casein in particular, and to accomplish this end by means which do not decompose the fatty compounds.

Now aside from the well-recognized beneficial influence of good pasture and water, it is manifest that the fragrance and sweetness of butter depend, to a large extent, if not entirely, on an unimpaired neutral state of the various fatty compounds of which the butter consists; whatever induces changes in these, is detrimental, and ought to be excluded. An unnecessary exposure to the air at a higher temperature than 58° to 60° F., particularly as long as the casein and the sugar of milk are not yet entirely removed, and the butter itself is still in a spongy condition, reacts most seriously in that direction. As soon as the churning has been finished, we endeavor to remove the buttermilk and render the fresh butter compact and hard. To accomplish this, salt is added, either in the form of a fine granulated mass, or in a concentrated solution,—the amount depending to some extent on the quantity of moisture in the butter. The salt acts in various directions: it contracts the butter, and thus causes a free discharge of the buttermilk; it dissolves the coagulated casein, and thereby aids to remove it; it fills the fat mass with a saturated saline solution, which excludes the air and serves as an antiseptic towards the small quantity of casein, which a limited washing has left behind.

Casein is what chemists call a nitrogenous compound; it is most remarkable on account of its disposition to break up into disagreeably smelling and tasting substances, and to impart its own instability to other more stable compounds; as, for nstance, butter. Pure butter is the most complicated natural

fat, consisting of not less than eight fatty acids in combination with a substance known in its insolated state by the name of glycerine. Four of these acids, in their isolated condition, are solids; four of them are liquids. These latter acids are remarkable for their unpleasant odor and taste. While still in combination with that peculiar compound, glycerine, that strong odor is not noticeable; but as soon as the combination by any cause is disturbed, the objectionable odor and taste become noticeable, and we recognize the fact by saying the butter is rank. The fatal reaction of casein on butter is merely a matter of time, which salt, even under favorable conditions, can only delay. The following rules are endorsed by practical and successful butter manufacturers: protect your milk against every offensive odor; collect the cream before the milk is sour; foment the cream gently before churning; do not churn at a higher temperature than 50° to 56° F.; carry the entire operation on with speed; shorten thus the injurious effect of air under very disadvantageous circumstances; wash the separated butter under little agitation, with a saturated solution of good dairy salt, and repeat the operation a few times, and finally, keep in mind that want of cleanliness will render all these precautions of but little use.

Cheese.—In reading the late statistical reports of the American Dairymen's Association, we notice among others the following statements:—

American annual production of cheese, two hundred and forty million pounds.

American annual demand for home consumption, one hundred and eighty million pounds.

English and Scotch cheese production, one hundred and seventy-nine million pounds.

Great Britain's annual consumption demands three hundred and nine million pounds, of which about fifty-five million pounds are from America, and the rest principally from Holland and Canada.

These figures tell us that we exceed England by millions of pounds in the production of cheese; that we consume less than half as much per head; and that profitable exportation to that market, hitherto the only one, is limited by competition. In

view of these facts, efforts have been made of late to stimulate home consumption in the interest of a branch of home industry of vast resources. The well-known practice of the people of England and other countries; the highly nitrogenous character of cheese, and its cheapness as compared with other articles of a similar elementary composition,—have all deservedly been urged with more or less modification as arguments in favor of a more liberal use of cheese. The main force of these arguments centres in the successful practice in England and elsewhere. To assume similar effects from substances of a similar elementary constitution is somewhat hazardous and unscientific—as long as the terms a *nitrogenous* food and a *nutritious* food have not yet been proved to be identical; the cheapness of an article of food depends entirely on its comparative intrinsic value. With these few remarks in advance, I believe that the object of my subsequent discussion will be recognized. To argue a question from more than one standpoint has aided usually in arriving at the truth.

A careful examination into the nature, the structure and the functions of the animal system, has revealed among others the following facts:—

First.—The organic portion of the animal system consists of two classes of compounds. One class is characterized by the constant admixture of the element *nitrogen*, and on that account the substances belonging to it are commonly called nitrogenous. They are the main constituents of the blood, and form the muscles and the flesh. The second class of compounds is characterized by the absence of the element nitrogen, and are usually called non-nitrogenous, or respiratory substances, and are particularly represented by fat in its various forms.

Second.—The same portions of elementary bodies, which constitute the various organs of the animal system at a given time, do not constitute them for all times. They fulfil certain functions only for a shorter or a longer period of time, and cease, sooner or later, to be of any value for the maintenance of normal animal life. They are subsequently, in consequence of a peculiar process of disintegration, secreted in various forms and in various ways, and are continually replaced in the form of food.

Third.—The process of respiration is the main source of

animal heat, and resembles closely, in its mode of action, the well-known process of combustion. Among its final results, most important is a vast amount of carbonic acid and water, which are also the results of the artificial combustion of starch, sugar, fat and similarly constituted articles, under the influence of a sufficient amount of oxygen, the active portion of air. Substances like starch, sugar, gums, cellulose, fats and oils of every description, in fact all such substances as consist of carbon and hydrogen, with or without oxygen, and which are known to chemists as carbo-hydrates and hydro-carbons (with but a few exceptions), are capable of supporting the process of respiration.

Fourth.—The process of nutrition consists mainly in the building up of bone and muscle during the period of growth, and the replacement of the tissues which have been wasted in the support of the mechanical force exerted. A successful nutrition depends on the consumption of such nitrogenous substances as are known by the collective name of albuminous compounds. These albuminoids are supposed to be formed originally in every case within the vegetable organism. Vegetable albumen (the gluten of the seeds of our cultivated cereals), and the vegetable casein, the legumen of the seeds of the Leguminosæ), are some of their most important representatives. Plants are therefore looked upon as the natural resource from which the animal kingdom, directly or indirectly, draws its requisite supply of nitrogenous matter for the formation of blood and its subsequent deposition of animal tissues, bones, muscles and fat. As a general rule, it must be conceded that they are of particular importance, as far as a successful nutrition is concerned, in their soluble modification, for in that condition they are more apt to be directly convertible without particular exertion of the apparatus of digestion.

Fifth.—Certain mineral substances, the phosphates, chlorides, sulphates and carbonates of both alkalies and alkaline earths, besides the oxides of iron and traces of manganese, silica and fluorine are essential to the general promotion of animal life. They are supplied by the mineral constituents of our articles of food. Foremost among these mineral constituents are the phosphates of lime, soda, potassa and magnesia, the chlorides of sodium and potassium, the sulphates of soda and potassa, and

the oxide of iron, besides smaller portions of carbonate of lime, fluoride of calcium, and silicic acid.

These observations are based upon numerous comparative analyses of the principal constituents of the animal system, and of the various kinds of food in use. The particular efficiency of our most important articles of food have been besides—*as is in this case of controlling importance*—repeatedly tested by practical experiments under varying, yet well-defined circumstances, for the purpose of securing a reliable basis in regard to the decision of the important question: In what actual relation do the different constituents of our various articles of food stand to the several functions, and the normal workings of the animal system in general? For many years past, physiologists and chemists have advanced the following general conclusions, which in their essential points are recognized to-day.

First.—There exists an actual connection between the nitrogenous portion of our food and the formation of the animal tissues, and the amount of muscular power which we are able to exert.

Second.—There is a certain relation between the amount of non-nitrogenous, or so-called respiratory, compounds of the food consumed, our respiration and the deposition of the fat within our systems. The nitrogenous portion of our food has been called the blood or flesh-forming part, and the non-nitrogenous, the respiratory or fat-forming portion. A special adaptation of the several proximate compounds, of which our vegetable and animal aliments are formed, we fully admit: yet, in attempting to construct tables for the representation of the comparative value of our various kinds of food, it has been assumed quite generally that all our common articles of food are to be rather valued by their flesh-producing than by their respiratory and fat-producing capacity. Hence their percentage of nitrogen has been recognized, with some limitation, as the standard by which their value as aliments ought to be decided. Judging from this standpoint, the analytical results, for instance, of both the Cheddar and the skim-milk cheese,—

	Cheddar cheese.	Skim-milk cheese.	
Water,	36.9	44.0	
Cheese matter, Casein,	2.90	4.50	(flesh-forming).
Fatty matter,	30.4	6.0	(respiratory).
Saline matter,	6.5	5.0	

we have to concede that cheese in general, and skim-milk cheese in particular, can claim a foremost place among our common articles of food on account of their very high percentage of nitrogenous or blood-forming constituents. However, scientific investigations of a later date, and closer observations of a successful practice in every-day life, have modified considerably the above assumed standard for the determination of the relative value of different nutritive substances. It has been proved that the comparative value of a food does not depend solely on its high percentage of nitrogenous constituents, but on a proper relative proportion of its nitrogenous and non-nitrogenous elements with the requisite amount and kind of saline constituents. Whatever, therefore, is wanting in one kind of food has to be supplied by some other, which completes the requirements of a normal diet. Cheese cannot be considered a complete food of man in the same sense as milk or bread. Its position is therefore a less important one. Wherever, under normal conditions, a diet is used which introduces nitrogenous constituents beyond a certain proportion, it will be wasted. There are other points which claim attention when a healthy diet is to be decided upon. A suitable form is of the utmost importance. In speaking in particular of the nutritious value of cheese, it is but proper, also, to call attention to the fact that it is not impossible that the peculiar process of fermentation which causes the transformation of coagulated casein—the curd—into cheese, may have impaired the value of the casein of the milk. Milk and cheese operate quite dissimilarly in our digestive organs; for a child, as a general rule, prospers on the casein of the milk, yet will be unable to assimilate it in the form of cheese; a more vigorous digestion, if I may use the expression, is needed to turn cheese to account. The casein in the milk, the curd and the cheese, are quite different forms of a nitrogenous substance, and it would be singular if that difference should be found not to extend farther; a badly flavored cheese—the

result of an excessive fermentation—is known to affect, frequently and seriously, the process of digestion. We are, unquestionably, well guided in our choice of cheese, for we prefer not only a sweet cheese, but also one that is rich in fatty matter. The good result noticed from a mixed food consisting of wheat bread and meat, as compared with wheat bread alone, has scarcely been questioned; cheese and bread are, no doubt, more wholesome and nutritious than cheese alone. Mankind has been guided instinctively, it appears, in selecting a congenial and healthy food for diverse climates and occupations. The market price of our main staple articles of food has been frequently pointed out as a *practical recognition* of their comparative intrinsic value as the sustainers of life and health. A good Cheddar cheese brings a higher price than a good skim-milk cheese. Wheat brings a higher price than oats. The fact that even the manufacture of articles of food turns, with the exception of cheese, almost entirely upon the concentration of respiratory substances, as sugar, starch, butter, wines, beer, etc., has been mentioned with some force as a proof that there is a greater want for non-nitrogenous than nitrogenous substances. A fact which manifests itself so universally, forces upon us the obligation to take notice of it. The following little list may convey some idea about the relative proportion of respiratory and flesh-producing constituents of some of our valuable articles of food :—

	Flesh-forming.	Respiratory.
Bread of wheat flour,	1.0	6.50
Meat of a fat ox,	1.0	6 90
Meat of half-fat ox,	1.0	3.83
Fat pig, sheep, lamb,	1.0	10.00
Old sheep, half-fat,	1.0	6.28
Cheddar cheese,	1.0	1.00
Skim-milk cheese	1.0	0.13
Pure milk,	1.0	2.5—3 0

When looking for a standard of a most congenial and nutritious diet we quite naturally incline to pronounce in favor of good milk. For we find in it, first, a large proportion and full representation of the most essential mineral constituents needed for our system, which cheese contains but in part; and, secondly, we recognize in it nitrogenous (casein) and non-nitrogenous

(butter and sugar of milk) substances in such condition and proportions as produce daily, under varied circumstances, the most satisfactory results.

Since we know that milk contains one part of nitrogenous substances to every two and one-half to three parts of respiratory constituents, we may obtain from the study of the composition of milk some useful hints in regard to the question, what is essential for a healthy diet, and what substances we ought to consume with cheese, when we aim at the desirable solution of the problem, under what circumstances we may be enabled to turn this, our most nitrogenous article of food, to the best advantage. In the scale of highly nitrogenous substances used by man as food, next to cheese stand our leguminousseeds; as pease, which contain 23.4 per cent, beans, 23.3 per cent., lentils, 24.0 per cent.

It is impossible to give even an approximate idea concerning the relative value of both cheese and leguminous seeds. The latter have confirmed their great value by their successful introduction in the diet of the German army during the late war with France. To get some definite idea to what extent cheese may be advantageously applied, as a part even of general diet, as beans and pease have been used, requires careful, well designed, comparative investigation; and nobody can doubt that the interest of both producer and consumer would be promoted by it.

C. A. Goessmann, *Chairman.*

Mass. Agricultural College, Amherst, Dec. 18, 1871.

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